AMERICAN GAS JOURNAL

91st YEAR | APRIL, 1949 | VOL. 170, NO. 4

How... MAY -6 1949

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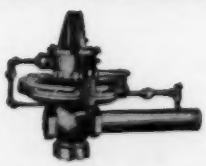
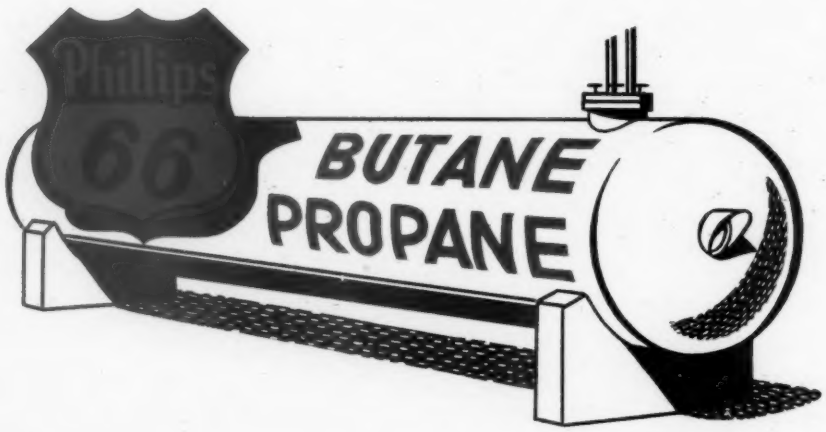


"1001" Regulators

Balance Va... Re...



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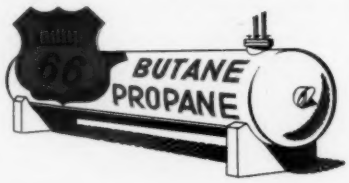

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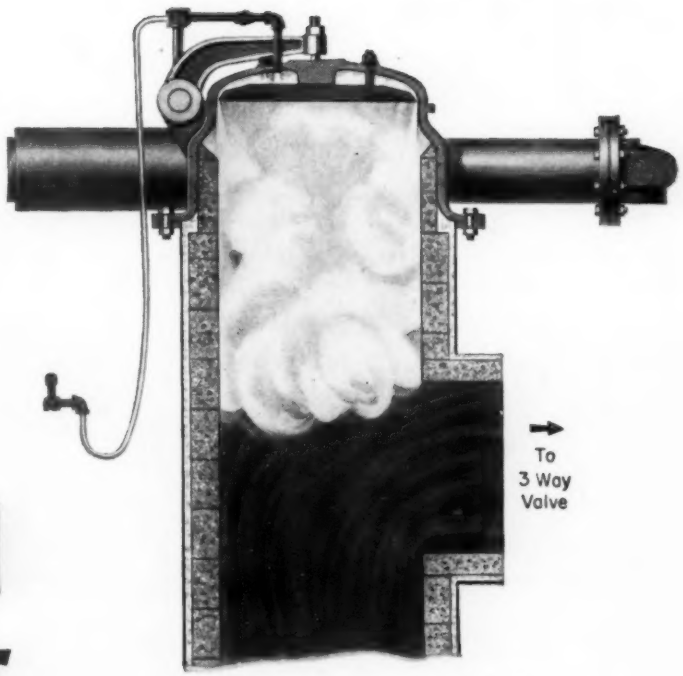

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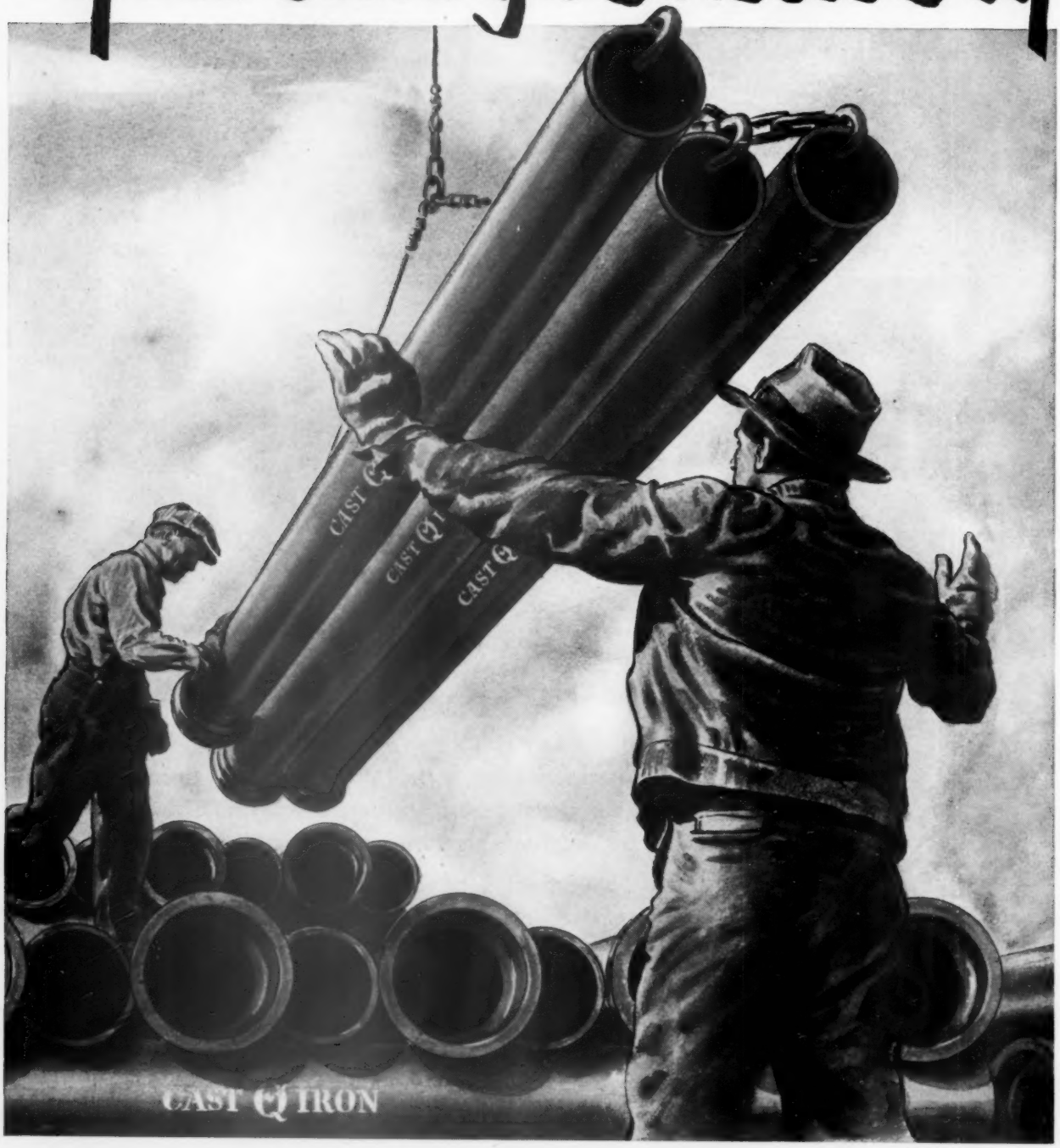

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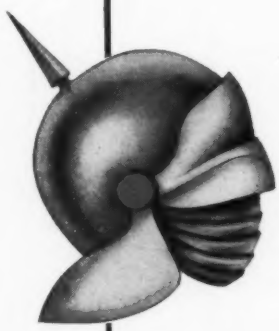

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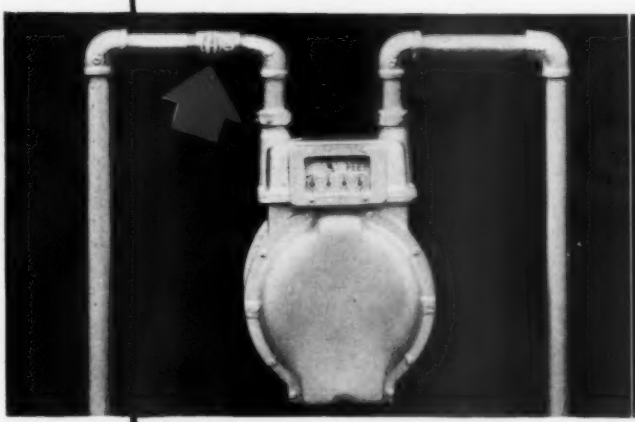
The installation of one of these fittings in the service line breaks the flow of all electrical current, giving a positive, practical and easy method of eliminating the corrosion caused by these currents.

The photographs below show two commonly used hookups for meter and service lines. Note the simplicity of both hookups.



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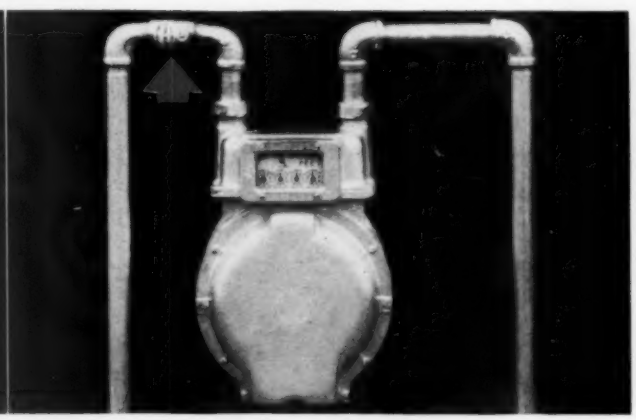

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ORLD

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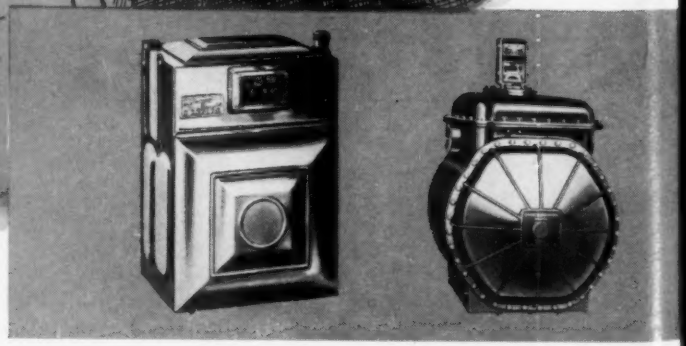
U. S. INDUSTRY FINDS GAS HAS GOT IT

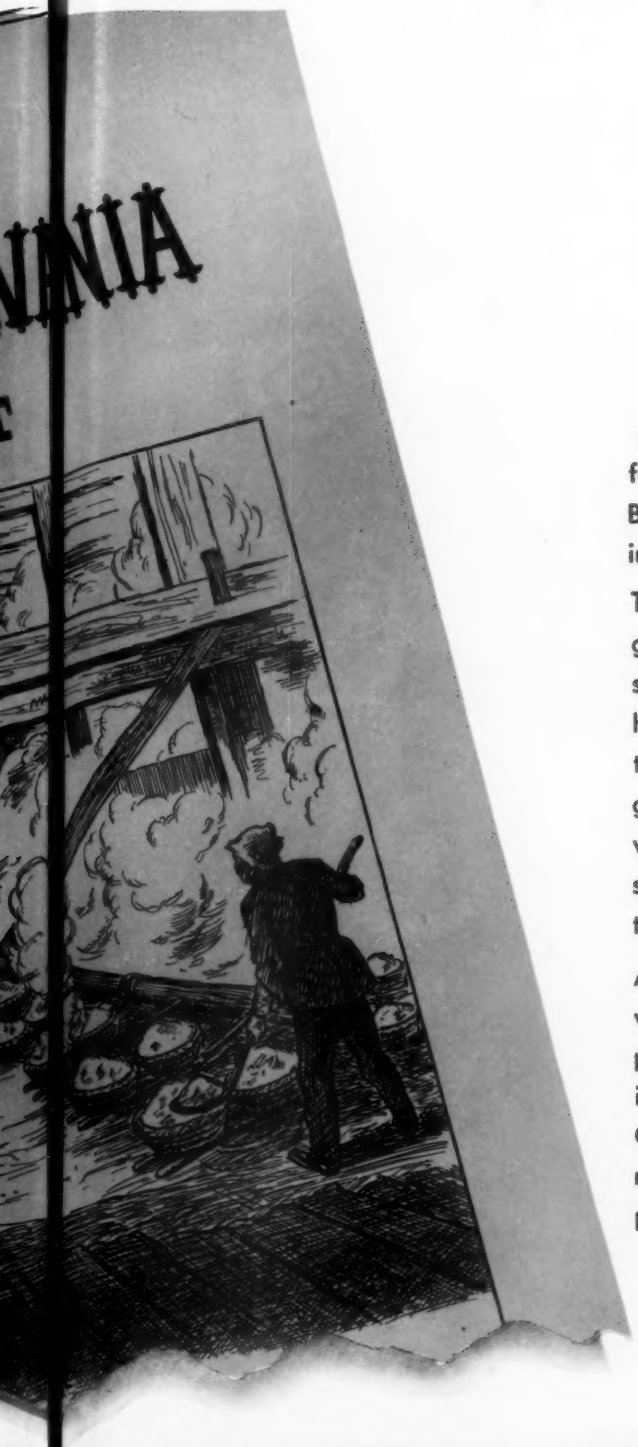
Natural Gas Spring Fuels Fires at Butler County Salt-Works

CENTERVILLE, BUTLER COUNTY, PA.—American enterprise is, once again, strikingly exemplified by the utilization of Natural Gas from the ground to supply heat for the evaporation of brine at the salt-works near here.

A pipe line conveys the fuel from a Natural Gas Spring to the nearby salt-works where the line then runs beneath rows of kettles containing the brine from which salt is made. By means of burners placed in the line under each kettle, a series of hot, even flames is produced which not only speed the process of evaporation, but also eliminate the need for building and tending multiple wood fires for this purpose.

One can well imagine the great saving in time and labor achieved by this ingenious use of the extraordinary properties of gas from the ground. As far as this publication can determine, this is the first use of Natural Gas in the industrial field. However, we venture to predict, it will not be the last.





Industrial use of gas has spread far and wide since 1840 when the salt-makers of Butler County, Pa., initiated what was probably its first industrial use.

Today, more than 320,000 miles of gas pipe lines and gas mains are teamed with accurate measurement to supply more than 21,000,000 users in industries and homes throughout the nation. The building and maintaining of this huge and vital supply line is one of the great achievements of our era—an achievement for which the industry and the country owe tribute to the skill, experience and devotion of the industry's distribution engineers.

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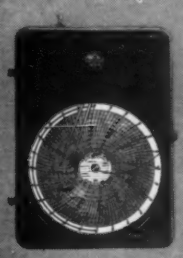

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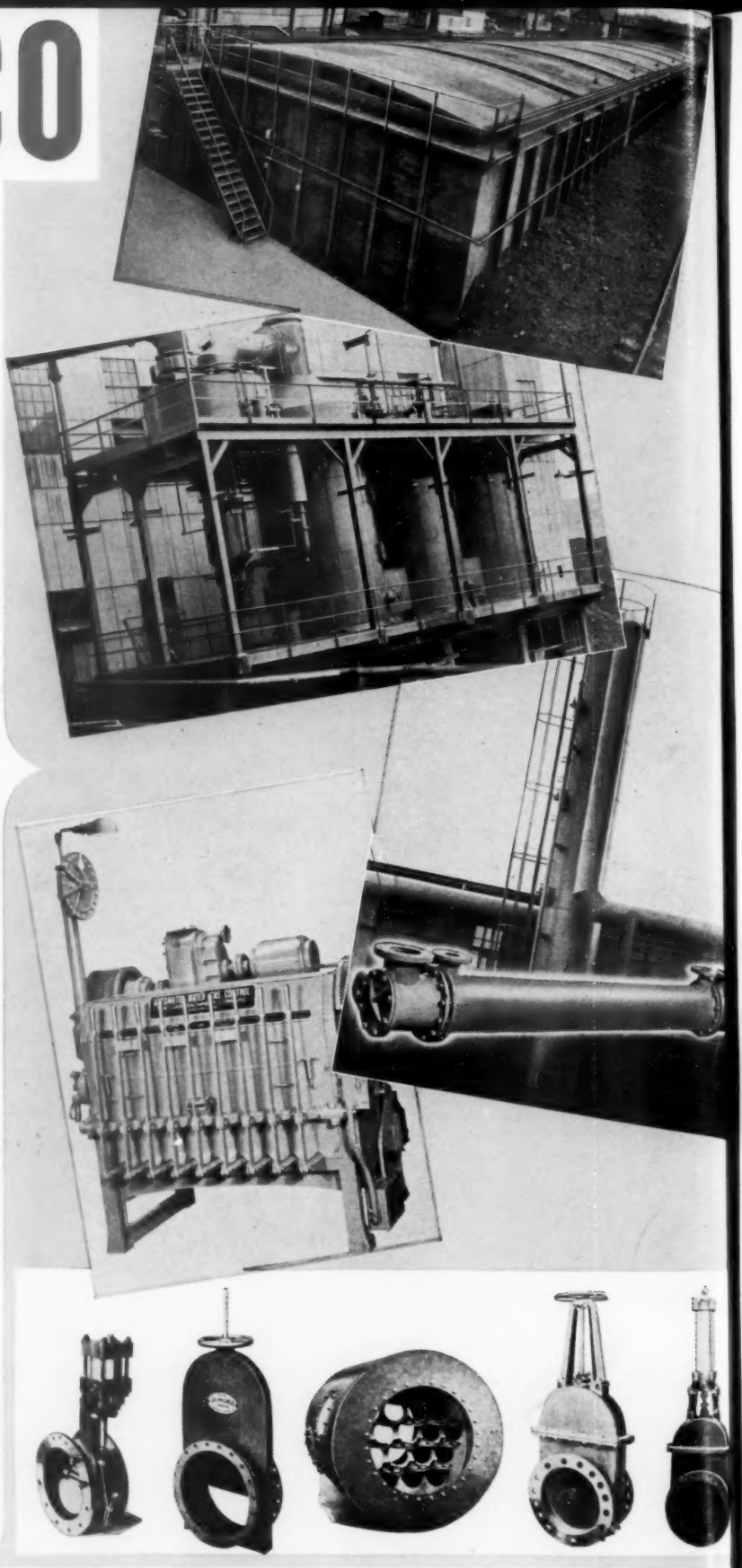

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VOLUME 170
Number 4

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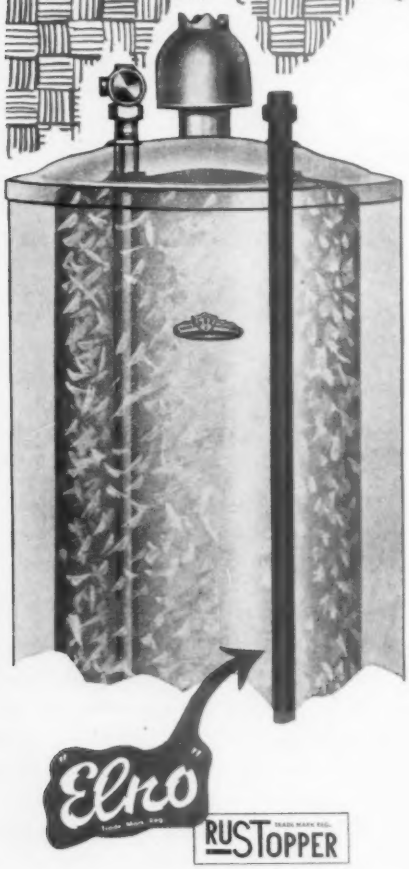
FIRST AGAIN...



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APRIL
1949

AMERICAN
GAS JOURNAL

VOLUME 170
NO. 4

Domestic Gas Water Heating

Chapter I—Engineering A. B. C.'s

By
Charles W. Merriam, Jr., B.S.M.E.

Now that the gas water heating sales campaign of 1949 is in full swing, this series of articles by Mr. Merriam will prove of intense interest and value to all gas appliance salesmen and dealers.

The author needs no introduction to our readers. A graduate of the University of Michigan with a B. S. degree in Mechanical Engineering, most of his career has been identified with the gas industry in which he has had broad experience.

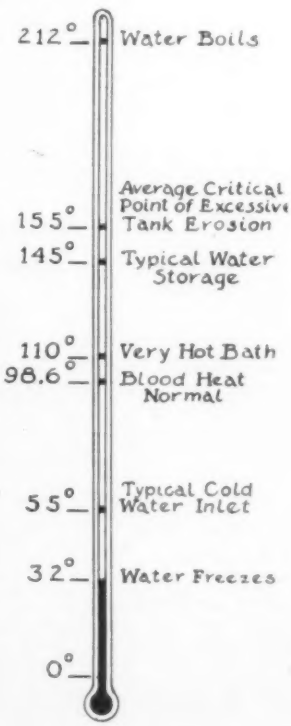
During World War 2, he served in the Navy for 43 months, being discharged with the rank of Lieutenant Commander U. S. N. R.

His series of articles on Household Gas Water Heating published in this paper 13 years ago, and later in book form, commanded national recognition and acclaim. Since then he has been actively identified with the design, engineering, manufacture and sales of gas ranges.

He now presents Domestic Gas Water Heating as of today. The series will prove a valuable contribution to the national campaign. Logically, he offers in this first chapter the A. B. C.'s of the subject.—Ed.

THE "know-how" of the individual retail salesman is a major factor in attaining (and more particularly in sustaining) a substantial record in selling domestic gas water heaters. A reasonable "know-how" requires at least a fluent speaking acquaintance with a few fundamental, so-called engineering terms. That these technical phrases are really quite simple will surprise some salesmen who are prone to regard the engineer as a "brain." To achieve a sound success in water heater selling, the common facts discussed in this chapter should be chewed upon until clearly understood. *So dig in—this is for dough—read slowly.*

First we must comprehend the difference between **Temperature** and **Heat.** Temperature is descriptive of a condition of a body or substance — for instance, water may be said to be hot, warm, cool or cold. Temperature might be said to be a measure of the tendency of a body to transmit heat to or to withdraw heat from another nearby body; temperature is a measure only of the intensity of the heat contained; then temperature describes the degree of hotness or coldness of a body. In general usage is the familiar Fahrenheit scale (abbreviated by the letter F) of temperature according to which water boils at 212°F* and freezes at 32°F. The scale between these two temperatures is divided for convenience on a thermometer into 212-32



or 180 equal spaces commonly called degrees (abbreviated by °). One degree of temperature, 1°F, is indicated by 1/180 part of the expansion of a mercury column in the stem of a thermometer (see drawing) which occurs when the temperature is raised from that of freezing water to that of boiling water. And then how about **Heat,** the supplying of which is the primary fundamental of the gas industry?

If one pound (1 lb.) of water is raised in temperature through 1°F a certain quantity of heat is obviously required to perform this work. This quantity of heat might have been named most anything but some "brain" chose to dub this measure or unit of heat a British Thermal Unit, whence the common handle, Btu. Thus it can be observed that whereas **Temperature** is a quality, **Heat** is a quantity. And heat has not been exactly defined yet, but that unfortunately involves a lot of academic theory about molecular activity[1] that is only remotely associated with most practical domestic gas applications. It is sufficient for our purposes here to recognize that heat energy is the cause of molecular activity. The important thing is that now you know that if water, a material substance, is raised from, let us say, a 65° inlet to 150° storage temperature (150—65=85°), it requires the absorption of 85 Btu. for each 1 lb. of water so raised; or for 50 lb. of water through a similar temperature rise, 50 times 85 = 4,250 Btu.; or conversely if 5 lb. of water are allowed to cool through a 15° drop then 75 Btu. are transferred to the air or surrounding material. Heat will always flow naturally or tend to be transmitted from a hotter to a colder body thus equalizing temperatures if sufficient time is allowed. Now, that's simple, isn't it?

In the gas business we are accustomed to think and speak of water in terms of gallons. Well, one gallon weighs 8-1/3 lb., from which it is apparent that the absorption of 8.33 Btu. is required to raise 1 gallon of water through 1°F in temperature. Remember this oft used constant—8.33 Btu. per gal. per degree temperature change is very elemental.

The gas industry is in the business of selling to the public a commodity which is basically heat in an unliberated state. The heat content of ordinary gases delivered by pipe distribution systems varies in different parts of the country. Some cities favored by location and other factors receive natural gas with as high as 1,200 Btu. per cu. ft., whereas other cities have manufactured gas of from 490 Btu. per cu. ft. and up[2]. In fact, millions of customers today, for reasons of economy and convenience, purchase Liquefied Petroleum (LP) in cylinders that store a liquid which, when released to atmospheric pressures, turns into a gas. Domestic customers, whether they know it or not, purchase gas in order that its heat content might be liberated for the purpose of bringing about some definite temperature change or to sustain some desired temperature condition. Among these many temperature operations might be listed: 1.—raising an oven from a room temperature of 70°F up to 350°F in which a cake is baked for 30 min., 2.—maintaining the inside temperature of a house at 72°F. against an outdoor of "10° above," 3.—heating water up to 115°F for dish washing purposes. In any event, gas is the source of the heat utilized to alter or to maintain a temperature condition. *Gas heat* (Btu.) might be said to be the *source* whereas *temperature* is the achieved *end.* The appliance or equipment apparatus facilitates the combustion of the gas fuel in a burner, directs the "freed" heat issuing therefrom, aids in the transfer of heat to the material whose temperature state is to be affected, and permits control of the temperature of such material for the purposes desired. And in that business, "Gas Has Got It."

Heat Definitions

At this point it might be well to discuss what the engineers label the **Latent Heat of Vaporization,** which is not actually as difficult as it sounds. We have defined water as boiling at 212°F. under ordinary conditions. In order to change its form or state, that is from water to steam, an extra 970.4 Btu. are required per lb. of water without any change in temperature occurring. Why it takes 970.4 Btu. of heat no one can satisfactorily explain, except that it is a proven fact that Nature cuts the cards that way. This has a lot to do with the gas business. Consider what we call tea pot, or kettle water heating on top of a stove—the average housewife for some obscure reason wants steam issuing from the kettle before using—think what this means. To raise 1 lb. of water from 65°F. to 150°F. or 85° requires, as shown, about 85 Btu., but to raise 1 lb. of water from 65°F. to steam at 212°F. requires (212-65) plus 970.4 = 1117.4 Btu.—over 13 times as much heat! So this vaporization business is quite important in kettle water heating and even more important in some types of top-of-stove cooking.

Of lesser importance is another term styled **Latent Heat of Fusion** which involves the heat absorbed from the surrounding atmosphere in melting ice (a solid) into water (a liquid) at constant temperature; or vice versa, the heat that must be taken away from water to make ice. This latent heat or fusion for water is 144 Btu. per lb. Other substances have different melting points and heats of fusion. The important point to observe is that basically transfer of heat is an inseparable part of the refrigeration process.[3]

Energy Terms

Another basic conception, a round understanding of which is fundamental to our subject, is that "Work," "Energy," "Heat" and "Power" are all interchangeable, or essentially are one and the same thing expressed in a different way, or are interconvertible, or as the engineers say, have a common denominator. Work is the application of a force (push, pull, lift) through some distance, as for instance lifting 10 lb. up to 5 ft., the result being called 50 foot-pounds of work. Power, often

[*] This is the boiling temperature of water at the atmospheric pressure at sea level. At higher elevations the boiling point diminishes as the atmospheric pressures are reduced. For instance, at 5200 ft. elevation, water boils at 202°F. At high elevations fusible plugs in temperature relief valves should be selected accordingly.

[1] The Kinetic Theory of Heat assumes that molecules, which make up all substances and matter of every kind, are in constant motion or vibration. Molecules which are the tiniest particles of all the materials of which the world is formed, such as water, air, steel and wood, are the very smallest imaginable bits of that particular kind of matter. Molecules in each separate sort of material are mutually attracted to one another by a cohesive force similar to magnetism. The imagination is taxed to comprehend that molecules even in dense matter are separated by space or a void that relative to the size of the molecule is large. Molecules are supposed to be perfectly elastic, bouncing from one to the other at a fixed speed without ever tiring out, the speed continuing at the same pace until energy is either added or subtracted in the form of heat. The speed at which molecules of any given material travel is a measure of the energy or heat content and consequently of the temperature—the greater the heat the more rapid the motion and hence the tendency of materials to expand or contract in volume under temperature changes.

[2] In some cities gas is sold on what is called the therm basis, a therm being that quantity of gas containing 100,000 Btu. of gross heating value. For instance, one therm is equivalent to 100,000 ÷ 540 or 185.2 cu. ft. of 540 Btu gas.

[3] Another obscure phenomenon of nature concerns the three forms or state of being of all substances, i.e., solid, liquid and gaseous. Definition is superfluous except to observe that 1. a solid maintains a fixed shape unless subjected to high heat or some pulling or pressing force, 2. liquid assumes by the force of gravity the shape of its container, and 3. gaseous is literally a state imposing no bounds. Heats of vaporization and of fusion mark the change or transition point respectively between a gas and a liquid and between a liquid and a solid. The Kinetic or Molecular Theory holds that these two mile-posts, vaporization and fusion, are critical stages, or sort of "busting" points, in the activity of the molecules. Each successive change in physical state represents a "main division point" in the attractive force of molecules each to each. To bring about a change in form or molecular arrangement is accomplished by a heat (which is energy) application, all of which proceeds without temperature fluctuation in the material itself.

measured in terms of horse-power, is simply doing work at the rate of 550 ft.-lb. each second. A horse-power on the other hand is the same basic thing only in another form, as heat utilized at the rate of 2,545 Btu. per hr. which, in turn, is the same as 746 watts. Heat, Energy and Power are frequently termed "stored work." So it goes round and round.

To us it is significant to note that 1,000 watts are equal to 1 Kw., containing 3,415 Btu. which if divided by 540 equals 6.5 cu. ft. of 540 Btu. gas or 3.4 cu. ft. of 1,000 Btu. gas. Conversely, 1 cu. ft. of 540 Btu. gas equals .158 Kwh. Note that this refers to potential thermal content, which is not necessarily the heat usefully employed in the appliance. In actual practice this "gas equivalent to electricity" varies, but for water heating is about 8.8 cu. ft. of manufactured gas equal to 1 Kwh., due to inherent differences in thermal efficiencies discussed later on. By the same token the heat stored in coal, wood or oil is subject to variable conditions of efficiency in the process of utilization. The true worth of any fuel from a competitive standpoint resolves itself into the cost not of the *potential* but rather of the *used* heat, or in other words the cost of accomplishing work. Better read these two paragraphs over again—there's a lot of meat.

How is this so-called "stored work" or heat obtained or released from common fuels such as coal, oil or gas? The general process of heat release or burning is called COMBUSTION, which, in truth, is nothing but a chemical change known as rapid oxidation, or the rapid combining of oxygen with the combustible elements of the fuel employed. For instance, 1 cu. ft. of methane (one of the principal ingredients of manufactured and natural gas) if combined chemically through burning with 2 cu. ft. of oxygen, will produce or release a gross heat of 1,023 Btu. previously stored in the fuel. In practice the oxygen for combustion is supplied by the air, which is made up roughly of one part of oxygen and four parts of nitrogen, the latter not entering into the chemical changes involved in burning is referred to frequently as a dilutant or an inert. Then to secure the necessary 2 cu. ft. of oxygen for the combustion of 1 cu. ft. of methane gas requires roughly, 10 cu. ft. of air. With the common forms of manufactured gas now distributed, which is made up of a mixture of several gases, the proper amount of oxygen to support combustion is obtained with from 4.5 to 6.5 cu. ft. of air per cu. ft. Roughly twice this proportion of air is required for natural gas. Every gas has a definite oxygen (or air) requirement depending upon the chemical elements composing the gas.[4]

Excess Air

Admitting air in amounts greater than that required for complete combustion is called supplying "excess air." Excess air does not enter into the process of chemical change incident to releasing the available stored heat in the gas burned. The extent to which excess air is admitted, for instance, to the combustion chamber of a water heater, has an important bearing upon the efficiency of the same. A stack or exit temperature of 450° is appreciably higher than a normal water storage temperature of 150° and hence constitutes a difference in temperature that represents an unrecoverable quantity of heat. Further consider that the volume (as well as the temperature) of the products of combustion escaping up the flue also influences the extent of the heat loss, from which it is apparent that any air over and above that necessary in affording the oxygen requisite for complete combustion is the cause of an unnecessarily increased volume of flue gases, hence of a source of added heat loss. It is likewise apparent that air not needed to support the chemical process of combustion will have a tendency to dilute or reduce the temperature of the flame. The control of "excess air" is one of the principal problems in the efficient combustion of gas. However, the lack of adequate air will cause incomplete combustion which in addition to introducing elements of danger and soot deposits tends to seriously reduce efficient utilization.[5] Better read that one over, too.

The term, **Thermal Efficiency,** with respect to a water heater, as an example, merely means the relation or ratio of the heat (Btu.) actually absorbed in the water to that of the heat (Btu.) released from the gas. Engineers dignify the situation by talking about the Third Law of Thermodynamics—whew, that sounds awful—but it merely means that energy (see Work, Heat and Power above) can be neither created nor destroyed, which, in our language, can be stated that the gas (heat) put into a water heater goes for one of two ends; namely: 1. Heating up the water (termed useful work), or 2. Heat wasted by either going up the stack or by radiation, etc., through the walls of the heater into the cellar. In other words, the heat usefully employed, plus the heat wasted must equal the heat (or gas in this case) supplied—an extremely simple fact that is often overlooked even by the self-styled experts. It is logical to conclude then that the higher the thermal efficiency the less the operating cost, hence the greater the customer satisfaction.

Conductivity

Every material has a distinctive ability to conduct heat through its own structure—thus a solid copper rod heated at one end conducts or transmits heat within itself so that soon the opposite end becomes hot (the material being said to have high **"Thermal Conductivity"**), whereas putting a wooden handle on the latter end tends to prevent scorching one's hand (hence wood is said to have a high **"Thermal Resistance,"** the reverse

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[4] For an advanced study, reference is made to "Combustion"—Industrial Gas series, Am. Gas Assoc. or "Fuels and Their Combustion" by Haslam and Russell, McGraw-Hill Book Co.

[5] Due to so many books being available on the physics and chemistry of combustion, only several points will be made herewith. Ordinary gases as distributed in cities are composed of mixtures of basic gases varying in proportion, each to each according to the heat content and the density of the mixture. These principal component gases with their respective chemical symbols following are: hydrogen (H_2), methane (CH_4), carbon monoxide (CO), a group known as illuminants (C_2H_6, C_2H_4, etc.) and the inerts, nitrogen (N_2) and carbon dioxide (CO_2). Although the latter two have no heat giving qualities, each of the other gasses will produce, when combined completely with oxygen, a definite amount of heat. The following equations indicate the heat giving properties of these component gases (Btu. per cu. ft. of combustible) together with the relative oxygen required and the products of combustion thus:

$H_2 + \frac{1}{2} O_2 = H_2O$ plus 323.5 Btu.

$CO + \frac{1}{2} O_2 = CO_2$ plus 321.7 Btu.

$CH_4 + 2O_2 = CO_2 + 2H_2O$ plus 1014.7 Btu.

$C_2H_6 + 3.5O_2 = 2\,CO_2 + 3H_2O$ plus 1781 Btu.

The left hand symbol in each of these equations represents one unit of the aforementioned principal gases, thus in the first equation one part of hydrogen (H_2) combines with one-half part of oxygen (O_2) to form one part of water (H_2O) plus 323.5 Btu. for each cu. ft. of H_2.

Each of these component gases joining with oxygen will always give the above results under identical conditions, the only variable in the heat content of the various gas mixtures as distributed being caused by the proportion of these component primary gases. The intricacies of combustion present more or less technical problems removed from day to day selling.

One worthwhile observation is to be made from the foregoing; namely, either H_2O (water vapor) or carbon dioxide (CO_2), or both, are the only products of combustion after complete oxidation has occurred. Water vapor is an odorless, colorless, harmless, in fact helpful, ingredient of the air we breathe, especially so in the winter when the humidity is low. Low humidity tends to dry the membranes of the nose and the throat, thus increasing germ susceptibility as well as preventing normal functioning of the human perspiratory system, thus producing a feeling of coldness. Carbon dioxide, the other product of combustion, is likewise an odorless, harmless, and colorless ingredient of the atmosphere, in fact that part of the air bleathed in by plants. Incidentally, plants breathe in CO_2 utilize the carbon therefrom and return the oxygen back again to the air. Thus it follows that no properly abjusted gas burner will ever give off soot or fumes to blacken vessels or soil walls—fundamental natural laws so say. The fact that the burning of gas requires oxygen does not necessarily mean that the household atmosphere has been "robbed of its oxygen" with a vitiating effect as frequently claimed by competitors, a fact that will be established incontrovertibly later on herein.

of **"Conductivity"**). This process of transmitting heat through material is called **Conductance.** Witnesseth, steel has a thermal conductivity of 26.1 compared to that of 0.042 for asbestos fibre, therefore, in order to keep heat inside a water tank the walls are wrapped with asbestos or some similar insulating material. The loss of heat from a storage tank (or a hot water pipe) is dependent, among other things, on the area of the surface, the difference in temperature of the water inside and of te air on the outside. More about these useful terms later.

Changes in temperature cause materials to expand or contract in bulk, the extent of which changes in size depend upon the temperature differential and also the characteristic of the particular material. This property is measured scientifically by what is termed the **Co-Efficient of Lineal Expansion**—thus, in each 1 in. of original length for each 1°F. increase (or decrease) in temperature, copper expands (or contracts) 0.000,009,3 and hard steel 0.000,005,6. The fact that dissimilar metals expand to a different length is the principle employed in some thermostats and safety shut-off gas valves described later on. By the same token materials expand (or contract) cubically as well as lineally. For instance, 1 cu. ft. of water at 62°F. weighs 62,356 lb., whereas at 212°F. the weight is 59.76 lb., an expansion of bulk involving a lessening of weight per cu. ft. (or decrease in density). This lightening of a substance is what causes water to rise to the top of the tank on heating. This same principle is the explanation of air circulation in a room—thus, at 60°F., 100 cu. ft. of air weighs 7.656 lb. and at 200°F. weighs 6.026 lb., in consequence of which air heated by a radiator is made lighter, hence rising to the ceiling. This process is one of the factors involved in the rising of the products of combustion up the flue of a water heater. Likewise cold air falls downward from the "Chiliator" of a refrigerator. This process of transferring or conveying heat by gravitation around from place to place through the medium of circulating some material (commonly water or air) is known as **Convection.**

Radiation

In the last two paragraphs we have seen that heat may be moved from one point to another by two different methods, viz, **Conductance** and **Convection.** A third method exists known as **Radiation,** an intriguing and surprising natural phenomenon. Ponder the transfer of heat from the sun to the earth's surface. The space between these two spheres being a virtual vacuum does not supply a medium for heat passage by either conductance or convection, both of which require benefit of material substance. As "spooky" as the process appears, the heat energy (Btu.) is transmitted by radiation, or more properly speaking by the vibration in undulatory waves of radiant energy progressing at the speed of light (186,300 mi. per sec.,) whose impulse originated in the sun's terrific incandescence. Radiant energy impinging on an earthly surface induces a molecular vibration with a corresponding heating effect therein. Just as a stone falling into a quiet lake produces concentric circles of ripples diminishing in proportion to the distance from the center of the disturbance so do waves of radiant heat energy lose intensity the greater the distance from the source. The smoother a surface the less capable are the waves of energy of "getting a foothold," consequently a rough surface will absorb radiant energy more readily than a smooth surface. Likewise the color of a surface conditions the absorption of radiant heat energy, white and silver being particularly good reflectors or repellers of radiant heat energy. What has radiation, a basic method of heat transfer, to do with the gas business? Plenty! This explains why black bottom cooking vessels should be used on electric ranges and present *no* substantial advantages on *gas* ranges; why galvanized tanks have less heat loss than black, and other practical selling points. In ordinary heating operations temperature changes involve simultaneously all three methods of heat transfer.

Specific Heat

Just one more of these basic engineering principles, and that has to do with **Specific Heat.** It has been stated that 1 lb. of water absorbs 1 Btu. in rising 1°F. in temperature. Thus water is said to have a specific heat of 1, inasmuch as specific heat is the number of Btu. that must be imparted to or subtracted from a substance to change the temperature 1°F. Other substances require a different amount of heat per lb. to increase the temperature 1°F. as can be seen from the following:

Aluminum	0.218	Iron	0.110
Asbestos	0.200	Tin	0.056
Air (13 cu. ft.)	0.237	Steel	0.120
Copper	0.092	Water	1.000

From a water heater point of view the importance is this: 1 ft. of ¾" steel pipe weighs 1.12 lb. and contains 0.2339 lb. of water. To raise the pipe and water 1°F. means that (1.12 x 0.110) plus (0.2339 x 1) = 0.3571 Btu. per ft. of length. Therefore, if a ¾" hot water line cools from 130° to 70°F., the loss per lineal foot is 0.3571 x (130—70) = 21.4 Btu.

Mastery of the foregoing engineering terms without further enlargement will doubtless provide sufficient technical handles for day-to-day retail selling. If this chapter stimulates you to a more inquiring and exacting inquiry it will have performed a noble purpose. Make this simple background a tool in your sales equipment and thoughts—Reread and think through this material until it becomes sort of second nature to you and from this will arise the beginnings of that rampant self-confidence essential to successful selling.

Chapter 2 of this series on Domestic Gas Water Heating will describe and compare Water Heater Types.—Ed.

Peak Load Experiences

By
George G. Dormer

Assistant Division Supt.
Pittsburgh Group Companies
Columbia Gas System

NATURAL GAS will soon arrive in Wisconsin. You are ready to accept the benefits of natural gas, but are you prepared to handle the problems which arise from those benefits? Is your gas distribution system adequate to handle tremendous peak loads due to gas house-heating? Is your gas plant in good condition and readily convertible to a high BTU gas process which will manufacture a natural gas substitute? These are only a few of the questions which I hope you will seriously consider before natural gas arrives in Wisconsin.

Natural gas is a cleaner fuel than manufactured gas. Natural gas has a higher heating value than manufactured gas: and last but most important to you today, natural gas is cheaper than manufactured gas. But because natural gas has all these good qualities, the advent of natural gas into a territory introduces peak load problems such as the manufactured gas man has never imagined. There is plenty of natural gas in the great state of Texas, but Wisconsin is more than 1000 miles from Texas, and since it is not always practical to build pipelines to carry your peak loads, it is sometimes necessary to manufacture large amounts of substitute gas during severe cold spells when those customers ahead of you on the pipeline exert a "practical priority" on the gas available during these emergency periods. To those of you who think natural gas is the solution to all your problems, let me add a word from experience—"Don't get caught with your plants down."

I am here today to tell you some experiences I have had with peak loads and substitute gases.

The Columbia Gas System

The Binghamton (N. Y.) Gas Works is a small part of Columbia Gas System which operates in the states of Ohio, Kentucky, West Virginia, Virginia, Maryland, Pennsylvania and New York, supplying 1,800,000 homes, business establishments and industries during the year 1947 with 231 billion cubic feet of natural gas. Approximately half this gas originated in the natural gas fields of West Virginia, Ohio and Pennsylvania. The remainder came from Texas via the Tennessee Gas Transmission and the Texas Eastern pipelines.

History of Binghamton Gas Works

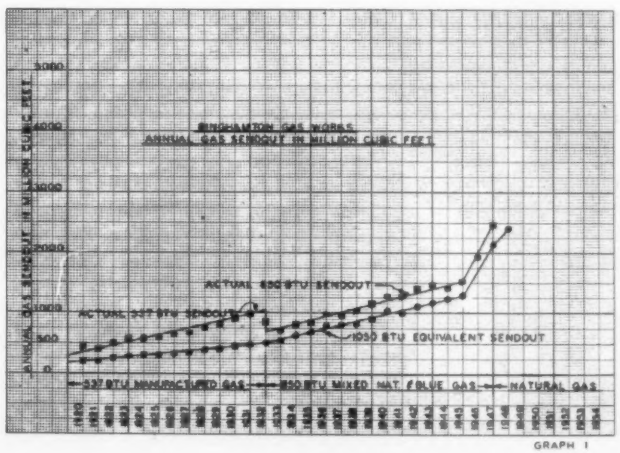
The Binghamton Gas Works during the year 1947 supplied 36,000 customers with approximately 2.5 billion cubic feet of natural and manufactured gas. The history of Binghamton Gas Works can be divided into three periods as shown on Graph I, namely, 537 BTU manufactured gas period from 1854 to 1932 during which we experienced a steady increase in gas sendout of approximately 10 percent per year; the 850 BTU mixed gas period from 1932 to 1945 during which we experienced a steady increase in gas sendout of approximately 11.5 percent per year; and the boom period from 1945 to 1947 when during a period of two years we experienced a 47% increase in annual gas sendout; and our peak day during the same period increased approximately 118% before we were able to place a moratorium on gas space heating. At the present writing we are forbidden by the New York State Public Service Commission from installing any additional space heating until May 1, 1949 at which time the matter will come up for further consideration. Let us examine the reasons why gas is so popular just sixty miles from the heart of the anthracite coal region.

Fuel Cost

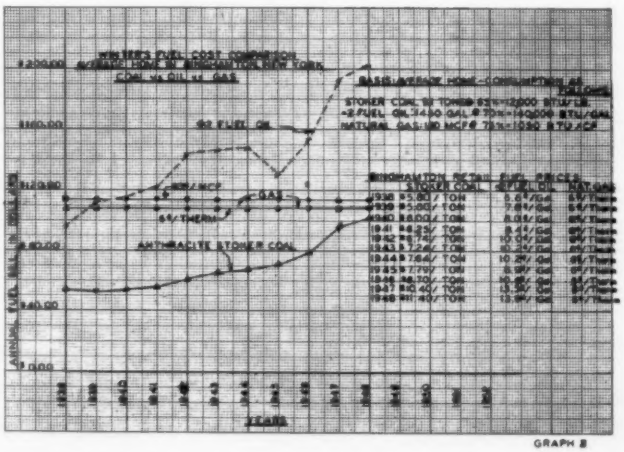
The present retail price of #2 fuel oil in Binghamton is 13.9 cents/gallon. Allowing 140,000 BTU/gallon and a combustion efficiency of 70% the cost of heating an average home in Binghamton has increased from approximately $100.00 in 1938 to approximately $200.00 in 1948 as shown on Graph II.

The present retail price of stoker coal in Binghamton is $11.40 per ton. Allowing 12,000 BTU/lb and a combustion efficiency of 65%, the cost of heating an average home with coal has increased from $53.00 in 1938 to $104.00 in 1948. This figure does not include stoker maintenance, nor the cost of hauling the ashes from your cellar.

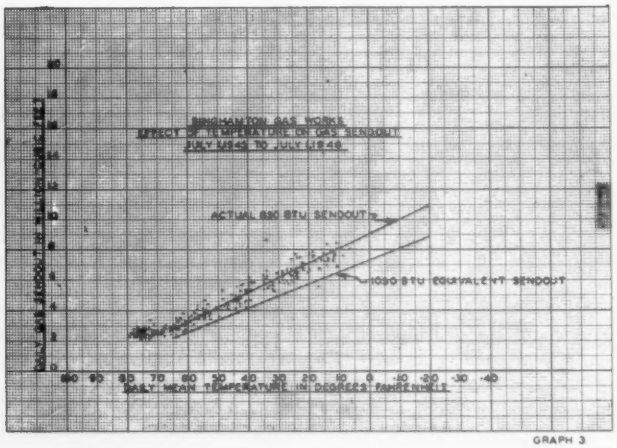
The present price of natural gas for househeating is approximately 6 cents per therm. Allowing 1050 BTU per cubic foot and a combustion efficiency of 75% the cost of heating an average home with gas has remained practically constant from


BINGHAMTON GAS WORKS
ANNUAL GAS SENDOUT IN MILLION CUBIC FEET
ACTUAL 850 BTU SENDOUT
ACTUAL 537 BTU SENDOUT
1050 BTU EQUIVALENT SENDOUT
537 BTU MANUFACTURED GAS
850 BTU MIXED NAT. FBLUE GAS
NATURAL GAS

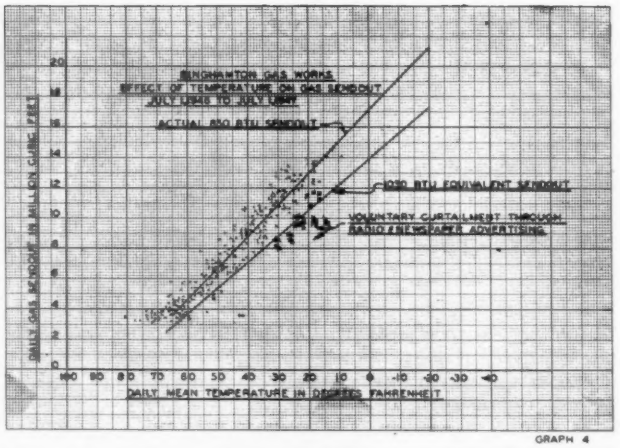
GRAPH I



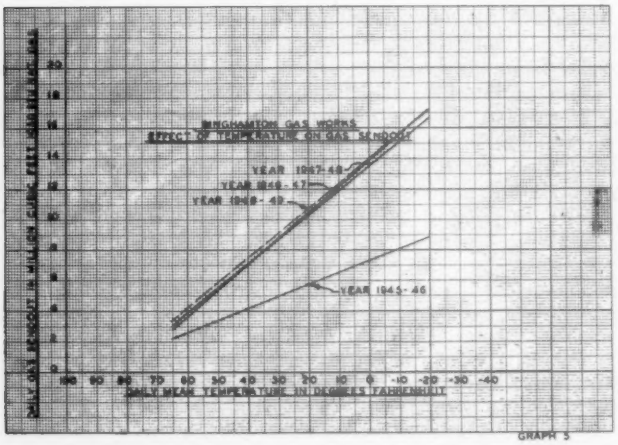
GRAPH II


BINGHAMTON GAS WORKS
EFFECT OF TEMPERATURE ON GAS SENDOUT
JULY 1945 TO JULY 1946
ACTUAL 850 BTU SENDOUT
1050 BTU EQUIVALENT SENDOUT
DAILY MEAN TEMPERATURE IN DEGREES FAHRENHEIT

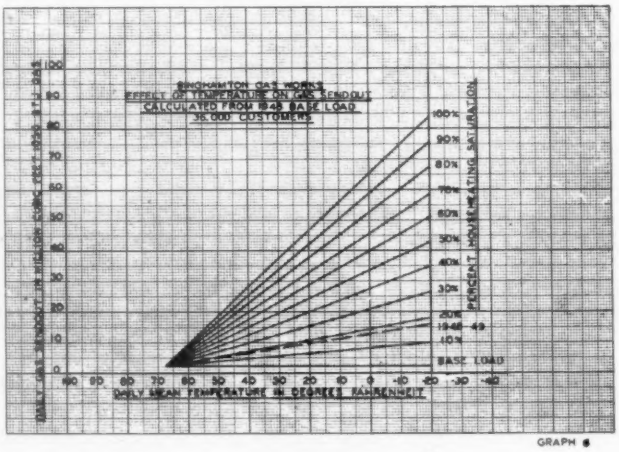
GRAPH 3


BINGHAMTON GAS WORKS
EFFECT OF TEMPERATURE ON GAS SENDOUT
JULY 1946 TO JULY 1947
ACTUAL 850 BTU SENDOUT
1050 BTU EQUIVALENT SENDOUT
VOLUNTARY CURTAILMENT THROUGH RADIO AND NEWSPAPER ADVERTISING
DAILY MEAN TEMPERATURE IN DEGREES FAHRENHEIT

GRAPH 4



GRAPH 5



GRAPH 6

1938 to 1948 at $114.00 per year. It is little wonder that gas with its cleanliness, its automatic operation and its low cost, is a bargain fuel.

Effect of Temperature on Gas Sendout

When natural gas makes it possible for you to remove restrictions on gas househeating, your winter load will grow "by leaps and bounds" and you certainly will want to know the effect of this additional load on your peak day requirements. It is highly desirable to know at all times, the number of customers in each classification, (1) cooking, (2) cooking and water heating, (3) cooking, water heating and househeating. If you do not have this information, there is no better way to get it than as part of your regular procedure in conversion of appliances from manufactured to mixed or natural gas. Knowing the number of customers in each classification, you can calculate from your meter books, the average consumption of each group of customers together with the total base load and peak load requirements. You can also plot your daily gas sendout against daily mean temperature day by day until you have enough points to determine the actual variation of your gas sendout with temperature. For this purpose we use the year beginning July 1st because in this way each year contains one complete heating season.

On Graph III for the year July 1, 1945 to July 1, 1946: We have plotted the actual 850 BTU daily gas sendout against the daily mean temperature for each day in the year, and the result is shown on this curve. We have added a second line which converts the 850 BTU daily gas sendout to 1050 BTU equivalent gas sendout.

On Graph IV for the year July 1, 1946 to July 1, 1947: We have plotted the actual 850 BTU daily gas sendout against the daily mean temperature. We have added a second straight line which converts the 850 BTU daily gas sendout to 1050 BTU equivalent gas sendout. You will note that the points do not follow as closely to a straight line as they did the previous year. We just did not have enough gas to meet our requirements and found it necessary to curtail by radio and newspaper advertising and by actually lowering the pressure in the mains during severe winter

BINGHAMTON GAS WORKS
EQUIVALENT NATURAL GAS SENDOUT v.s. DAILY MEAN TEMPERATURE

	BASE LOAD 65 DEG. FAHRENHEIT		PEAK LOAD -10 DEG. FAHRENHEIT	
YEAR 1945- 1946				
22,500 customers--cooking only	• .04 MCF/day	912 MCF/day	• .04 MCF/day	912 MCF/day
8,300 customers--cooking and water heating	• .13 MCF/day	1,079 MCF/day	• .13 MCF/day	1,079 MCF/day
1,200 customers--cooking, water heating, househeating	• .13 MCF/day	247 MCF/day	• 3.80 MCF/day	4,080 MCF/day
33,000 customers		2,238 MCF/day		6,071 MCF/day
YEAR 1946 - 1947				
17,900 customers--cooking only	• .04 MCF/day	716 MCF/day	• .04 MCF/day	716 MCF/day
10,700 customers--cooking and water heating	• .13 MCF/day	1,391 MCF/day	• .13 MCF/day	1,391 MCF/day
5,400 customers--cooking, water heating, househeating	• .13 MCF/day	702 MCF/day	• 2.60 MCF/day	13,500 MCF/day
34,000 customers		2,809 MCF/day		15,607 MCF/day
YEAR 1947 - 1948				
16,200 customers --cooking only	• .04 MCF/day	648 MCF/day	• .04 MCF/day	648 MCF/day
13,000 customers--cooking and water heating	• .13 MCF/day	1,690 MCF/day	• .13 MCF/day	1,690 MCF/day
5,800 customers--cooking, water heating, househeating	• .13 MCF/day	754 MCF/day	• 2.20 MCF/day	12,760 MCF/day
35,000 customers		3,092 MCF/day		15,098 MCF/day
YEAR 1948 - 1949				
14,100 customers--cooking only	• .04 MCF/day	564 MCF/day	• .04 MCF/day	564 MCF/day
16,100 customers--cooking and water heating	• .13 MCF/day	2,093 MCF/day	• .13 MCF/day	2,093 MCF/day
5,900 customers--cooking, water heating, househeating	• .13 MCF/day	767 MCF/day	• 2.20 MCF/day	12,980 MCF/day
36, 100 customers		3,424 MCF/day		15,637 MCF/day
YEAR 1949 - 1950 (Estimated)				
10,900 customers--cooking only	• .04 MCF/day	436 MCF/day	• .04 MCF/day	436 MCF/day
18,000 customers--cooking and water heating	• .13 MCF/day	2,340 MCF/day	• .13 MCF/day	2,340 MCF/day
8,100 customers--cooking, water heating, househeating	• .13 MCF/day	1,053 MCF/day	• 2.20 MCF/day	17,820 MCF/day
37,000 customers		3,829 MCF/day		20,596 MCF/day

weather when we did not have enough gas to met the demands placed upon us.

On Graph V we have plotted the 1050 BTU equivalent natural gas sendout for the past three years against the daily mean temperature, thus showing the growth of our househeating load.

You will want to know the effect of 10%, 20%, 30%, 50% or even 80% or 90% of your customers changing from other fuels to heating with gas. On Graph VI we have plotted the effect of daily mean temperature on daily gas sendout for various percentages of househeating saturation. The dotted line shows our present status at about 16 percent househeating saturation; and the only reason we are not up at least twice as high today is the fact that during the years 1946 and 1947 when John L. Lewis increased the price of coal, and we freely installed gas conversion burners, there were not enough plumbers or gas fitters in the city to install any additional conversion burners. We predict that if space heating is again made available to the public on an unlimited basis we would increase our househeating saturation by 10 percent per year as long as the present ratio of fuel costs exists.

Substitute Gas Facilities Available

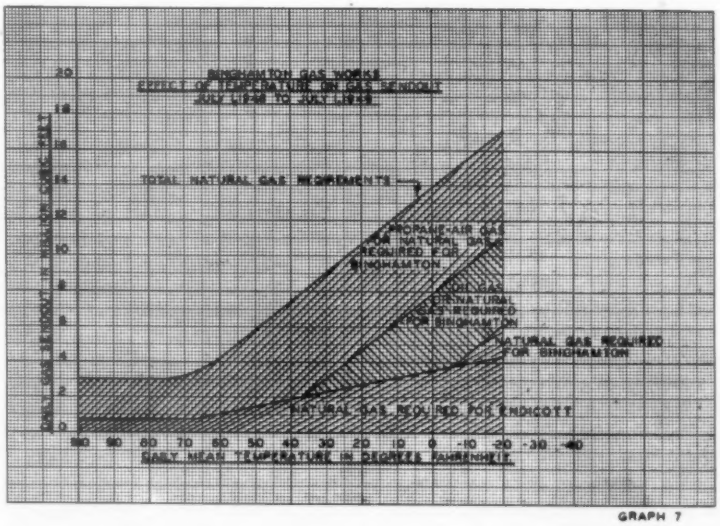
The Sendout Vs. Daily Mean Temperature Curve is also useful in determining the proportion of total sendout which can be carried with substitute gas under any given temperature conditions. We show on Graph VII the following:

1. The variation of our total daily sendout with daily mean temperature, estimated for the winter 1948-1949.
2. The proportion of our daily gas sendout which we can replace with 1500 BTU propane-air gas. We have a propane-air plant with a natural gas replacement capacity of 6 million cubic feet per day. We can store 800,000 gallons of propane.
3. The proportion of our daily gas sendout which we can replace with 1035 BTU oil gas. We have two 11'0" water gas sets which have been converted to Gas Machinery's Twin Generator Oil Gas Process. Overall plant capacity is 5 million cubic feet of 1035 BTU gas per day. Oil storage is 1,200,000 gallons.

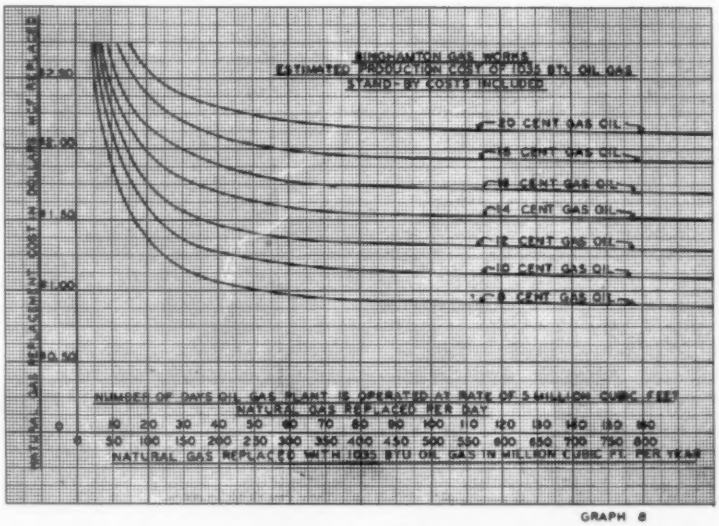
Cost of Substitute Gas

It is desirable to have enough gas production capacity to carry a large portion of your total sendout during emergency or peak load periods when sufficient quantities of natural gas are not available; but if these emergencies last for any period of time, and your rates are based on the cost of natural gas, you can rapidly "go broke" making relatively expensive substitute gas and selling it for the price of natural gas.

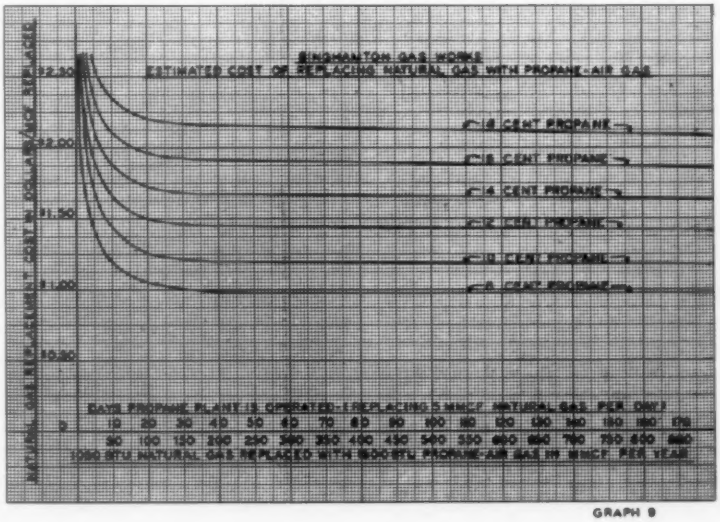
On Graph VIII we have plotted the production cost of 1035 BTU oil


BINGHAMTON GAS WORKS
TOTAL NATURAL GAS REQUIREMENTS
PROPANE-AIR GAS OR NATURAL GAS REQUIRED FOR BINGHAMTON
NATURAL GAS REQUIRED FOR BINGHAMTON
NATURAL GAS REQUIRED FOR ENDICOTT
DAILY MEAN TEMPERATURE IN DEGREES FAHRENHEIT

GRAPH 7


BINGHAMTON GAS WORKS
ESTIMATED PRODUCTION COST OF 1035 BTU OIL GAS
STAND-BY COSTS INCLUDED
20 CENT GAS OIL
18 CENT GAS OIL
16 CENT GAS OIL
14 CENT GAS OIL
12 CENT GAS OIL
10 CENT GAS OIL
8 CENT GAS OIL
NUMBER OF DAYS OIL GAS PLANT IS OPERATED AT RATE OF 5 MILLION CUBIC FEET NATURAL GAS REPLACED PER DAY
NATURAL GAS REPLACED WITH 1035 BTU OIL GAS IN MILLION CUBIC FT. PER YEAR

GRAPH 8


BINGHAMTON GAS WORKS
ESTIMATED COST OF REPLACING NATURAL GAS WITH PROPANE-AIR GAS
18 CENT PROPANE
16 CENT PROPANE
14 CENT PROPANE
12 CENT PROPANE
10 CENT PROPANE
8 CENT PROPANE
DAYS PROPANE PLANT IS OPERATED-REPLACING 6 MMCF NATURAL GAS PER DAY
1050 BTU NATURAL GAS REPLACED WITH 1500 BTU PROPANE-AIR GAS IN MMCF PER YEAR

GRAPH 9

gas against the number of days our oil gas plant is operated each year, showing a separate curve for gas oil prices varying from 8 to 20 cents per gallon. The natural gas replacement costs shown include operating and maintenance charges for keeping the plant in condition to manufacture 5 million cubic feet of natural gas substitute per day. Fixed charges on investment are not included in the above figures.

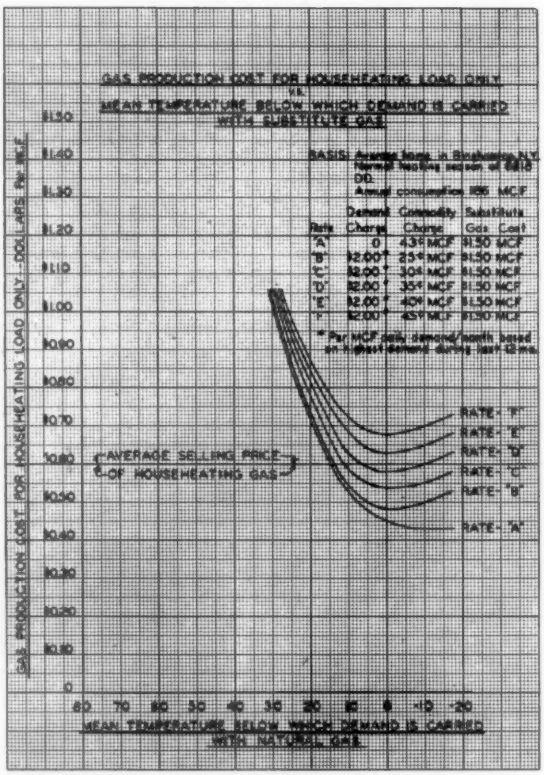
On Graph IX we have plotted the production cost of 1500 BTU propane-air gas against the number of days our propane-air plant is operated each year, showing a separate curve for propane prices varying from 8 to 18 cents per gallon. The natural gas replacement costs shown include operating and maintenance charges for keeping the plant in condition to manufacture 5 million cubic feet of natural gas substitute per day. Fixed charges on investment are not included in these costs.

Cost of Carrying Peak Loads With Substitute Gas

We would like to recommend that you study the paper "Peak Gas Economics" by Lester J. Eck, Vice President of the Minneapolis Gas Light Company, presented at the annual meeting of the Mid-West Gas Association at Minneapolis in April 1948.

Using the method outlined by Mr. Eck, we have calculated the gas production cost required to supply one average customer during a normal winter in Binghamton, New York, with his househeating requirements only, of 186 MCF natural gas or equivalent, using substitute gas to obtain the lowest possible gas production cost for the season. We have made the above calculation for a rather wide variation in rates so that you can pick the curve that most closely approximates your condition.

Graph X shows the average cost of househeating gas as plotted against the mean temperature below which the demand is carried with substitute gas. We have the problem of determining how we can meet our peak with substitute gas and still make money with unlimited househeating. business.



Graph X:—Gas Production Costs For House Heating Load

BINGHAMTON GAS WORKS
PRODUCTION COST OF NATURAL GAS SUBSTITUTES
STAND-BY COSTS NOT INCLUDED

REQUIRED:
To replace 5 million cubic feet per day of 1050 BTU natural gas with (a) an equivalent amount of 1035 BTU oil gas, and (b) an equivalent amount of propane-air gas.

CALCULATIONS:

(a) Replace 5 million cubic feet of 1050 BTU natural gas with oil gas.

1035 BTU oil gas required for replacement	5,070. MCF			
Make oil required	50,700. Gal	@ $ .14 /gal	$ 7,098.00	
Heat tar required	6,250. Gal	@ $ .09/ gal	$ 562.50	
Boiler coal required	25. Tons	@ $ 8.00/ ton	$ 200.00	
Operating and maintenance labor required	136. Man Hrs.	@ $ 1.41/ hr.	$ 191.20	
Water and electricity required			$ 20.00	
Operating supplies and maintenance materials			$ 80.00	
Total			$ 8,151.70	
Less tar credit (16% of make oil)	9,125. Gal.	@ $ .08 /gal	$ - 720.00	
Total oil gas production cost	5,070. MCF			$ 7,431.70
Cost per MCF oil gas produced			$ 1.47 /MCF	
Cost per MCF natural gas replaced			$ 1.49/ MCF	

(b) Replace 5 million cubic feet of 1050 BTU natural gas with Propane-air gas.

1500 BTU propane-air gas required for replacement	3,500. MCF			
Propane required	57,200. Gal	@ $ .127/ gal	$ 7,271.50	
Boiler and compressor gas required	140. MCF	@ $ .45 / MCF	$ 63.00	
Operating and maintenance labor required	48. Man Hr.	@ $1.40 / HR	$ 67.20	
Water and electricity required			$ 10.00	
Operating supplies and materials			$ 20.00	
Total propane-air gas production cost	3,500. MCF			$ 7,431.70
Cost per MCF propane-air gas produced			$2.12 / MCF	
Cost per MCF natural gas replaced			$1.49 / MCF	

Summary

When natural gas arrives in Wisconsin:

1. You will find that the public will demand that you supply them with natural gas to heat their homes and provide them with a clean automatic fuel at a reasonable cost.

2. You will find that you may be able to temporarily ban or limit gas househeating but there will come a time when you as a public utility will find it necessary to meet all househeating requirements with natural or substitute gas.

3. You will find that the change from 520 BTU manufactured gas to natural gas will double the size of your gas distribution system, but that will not be enough. You will find it necessary to remove many distribution system bottle-necks which should have been removed while you were still on manufactured gas.

4. We have suggested a method by which you can estimate the ultimate requirements of your natural gas system, and each year follow the new peak loads which you will establish.

5. It is your problem to determine at what rate you can afford to sell househeating gas, what standby facilities you will maintain to protect your continuity of pipeline supply and to provide peak load capacity. It is my personal opinion that the investment cost of these standby facilities should

(Concluded on page 50)

Interchangeability Characteristics of Oil Gases

By

Arthur W. Krause & Alvin M. Cunningham

Staff Engineers

The Gas Machinery Co., Cleveland, Ohio

Part 1. Interchangeability of Oil Gas with Natural Gas

Importance of High BTU Oil Gas

MUCH THOUGHT and experimental work has been devoted in recent years to the study of oil gas manufacture by individuals, companies and colleges. This has been due mainly to the following factors:

Increased consumption of gas has caused increased gas supply demands;

Supply of natural gas often cannot meet these increased demands;

Natural gas supply may decrease in certain localities in the future;

Shortage and cost of pipe line has led to consideration of a high Btu gas;

Cheap grades of oil have been found practical for oil gas manufacture;

A clean, flexible, inexpensive, automatic process is desired by the gas industry to handle peak load demands.

As an indication of the increased commercial use of oil gas by gas utilities, both as a peak load and as a base load, it may be mentioned that The Gas Machinery Company has installed or converted 34 plants using a solid fuel process for which the original development was started in 1933. Later modification and development resulted in a 100% oil process now known as "Hi-Btu Oil Gas". This may utilize either single or twin generators of which 40 installations have been made during the past two years and considerable work is scheduled for the future.

This article is being presented at this time since satisfactory interchangeability of oil gas and oil gas-air with various city gases has become an important problem and since discussion of this subject in technical journals has been quite limited.

The authors of this article are both familiar with interchangeability problems, having previously been associated with the experimental, analytical and calculation phases of gas interchangeability research at the American Gas Association. Their present duties include engineering analysis of customers' interchangeability projects. — Ed.

Previous Articles On High BTU Oil Gas

The reader may wish to review the history, the economics and the equipment and processes for high Btu oil gas production as a background for this article on interchangeability. Accordingly, he may refer to recent pertinent articles (Bib. 1 to 13) which we would like to recommend and which are included in the bibliography.

American Gas Association Interchangeability Data

"Interchangeability of Other Fuel Gases with Natural Gases" (14), Research Bulletin No. 36 of the American Gas Association Testing Laboratories and previous other related mixed gas research reports have covered a large number of fuel gases but oil gases were not considered for supplementing natural gas perhaps because of the fact that they were relatively unknown at that time.

The recent American Gas Association Testing Laboratory Research Report No. 1106-A, "Interchangeability of Other Fuel Gases with Coke Oven Gas" (15), has provided a great deal of actual interchangeability data and computed indices related to substitution of oil gas—diluent gases* for coke oven gas. In the near future similar reports regarding interchangeability of other fuel gases with carburetted water gas (low inerts), carburetted water gas (medium inerts), carburetted water gas (high inerts), mixed coke oven gas-carburetted water gas, and natural gas—blue gas—cracked natural gas—producer gas are expected to be published.

Mixtures of oil gas and diluent gases which were employed in this mixed gas research investigation (15) were made up generally from an oil gas having a heating value of 1500 Btu per cu. ft.

In Bulletin No. 10, "Research on Fundamentals of Atmospheric Gas Burner Design" (16), characteristic lifting and yellow tip limit curves are presented for a typical oil gas and natural gas as obtained with the A.G.A. precision burner. These curves indicate that the percent primary air, at which yellow tips and lifting begin to develop, is much lower (approximately 20%) for natural gas than for oil gas.

Experimentally determined flash-back limit curves are presented in Fig. 1 for a 1050 Btu natural gas and for a 1215 Btu and 1500 Btu oil gas which will indicate the greater flash-back characteristics for the oil gases. Flash-back occurs within the boundary of the curve. These flash-back limit curves were obtained also with the A.G.A. precision burner using a different burner head.†

Limits of This Interchangeability Study

Utilities are mainly interested in

** Diluent gas-air, producer gas, blue gas and unenriched reformed natural gas, all having heating values less than 320 Btu per cu. ft.*

† Recent research—unpublished data.

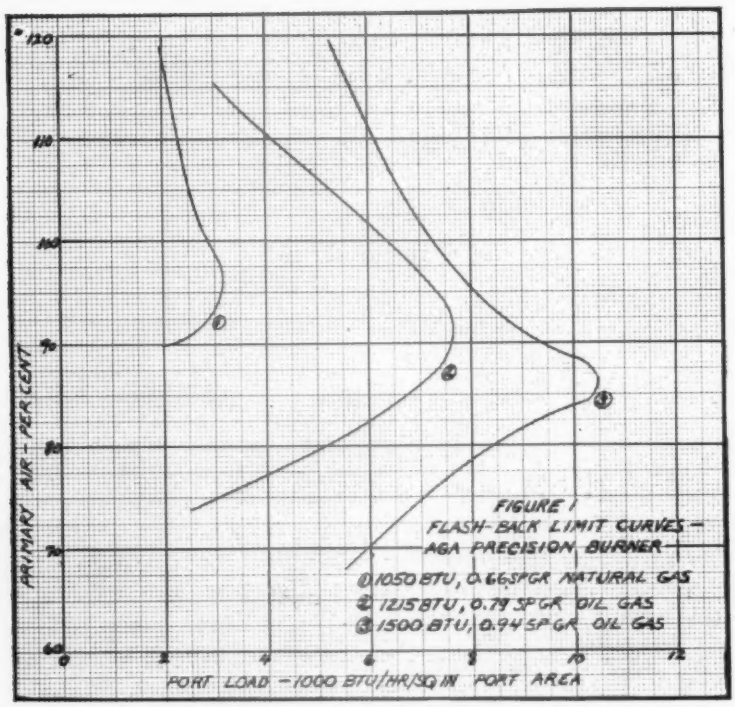


FIGURE I
FLASH-BACK LIMIT CURVES — AGA PRECISION BURNER

an oil gas with a heating value much lower than 1500 Btu and accordingly this article will deal with such oil gases, approximately 900-1200 Btu.

Interchangeability of oil gases and oil gas-air mixtures with utility gases is presented herewith only by means of the A.G.A. calculation method (14) (15) since at the present time it apparently is the most reliable (17).

The study has been confined to an interchangeability problem relative to the proper operation of domestic and commercial appliance burners of the atmospheric type.

Gas Analyses

Gas analyses for various typical natural gases and oil gases studied in this article are presented in Table 1. These data were taken from various actual analyses supplied mainly by companies employing or manufacturing these gases. The break-down into individual constituents for the illuminants were estimated in most cases from previous analyses of oil gases obtained at the American Gas Association Laboratories with a Turner-Burrell Adsorption Fractionator. This break-down as indicated in Table 1 agrees in general with an analysis break-down for certain oil gases by Podbielniak distillation. (12)

A table of "High Btu Gases from Gas Oil or Diesel Oil" (12) has been prepared by Edwin L. Hall. The analyses for the seven oil gases presented indicate that these gases may consist of blue gas (3-16%), oil gas (70-85%), and products of combustion and air (less than 10% except for twin generator type operation in which up to 27% may occur). On this basis the heating value of oil gas would increase above the value normally reported for the combined oil gas mixture.

The knowledge that the character of the illuminants as obtained by analysis would aid in determining interchangeability has been recognized in the past (18). It is surprising that such little investigation has been made with regard to illuminants analyses by gas utilities, especially in view of the fact that the composition of these illuminants may cause unsatisfactory burner performance. Acetylene, for example, is very seldom determined by gas utilities, although it may exist in oil gases (18) and cause flash-back difficulties since acetylene has an unusually high ignition velocity, approaching that of hydrogen (19).

The specific gravities and heating values listed in Table 1 are observed values. They agree reasonably well with values calculated from the analyses with the exception of the sp. gr. of the 1215 Btu oil gas, the calculated value being quite lower.

TABLE I

CHEMICAL COMPOSITION AND PROPERTIES OF GASES

Type of Gas	Nat. Gas Low Inert	Nat. Gas High Inert	Oil Gas	Oil Gas	Oil Gas	Oil Gas
Heating Value Btu/cu.ft.	1040	1014	977	960	1215	1500
Specific Gravity	0.635	0.677	0.63	0.74	0.79	0.94
Chemical Composition - Percent by Volume						
Blue Gases:						
CO			2.6	1.1	0.5	1.1
H_2			24.2	18.5	21.5	16.0
Sub-total			26.8	19.6	22.0	17.1
Hydrocarbon Gases: Saturated						
CH_4	86.7	73.5	43.8	32.9	38.9	28.5
C_2H_6	10.4	15.1	2.2		6.0	6.4
C_3H_8					0.7	1.0
Sub-Total	97.1	88.6	46.0	32.9	45.6	35.9
Unsaturated:						
C_2H_4			16.4	17.6	18.9	26.6
C_3H_6			1.1	3.5	9.3	13.5
C_4+			3.6	3.5	3.0	4.8
Sub-Total			21.1	24.6	31.2	44.9
Non-Combustible Gases						
CO_2	0.1		1.1	4.2	1.2	1.9
O_2	0.9	0.5	1.0	1.7		0.2
N_2	1.9	10.9	4.0	17.0		
Sub-Total	2.9	11.4	6.1	22.9	1.2	2.1

TABLE II

CALCULATED INTERCHANGEABILITY INDICES FOR OIL GASES USED AS SUBSTITUTES FOR TWO DIFFERENT TYPES OF NATURAL ADJUSTMENT GASES

	1014 Btu-0.68 sp gr Nat. Gas (high inerts) as Adjustment Gas				1040 Btu-0.64 sp gr Nat. Gas (low inerts) as Adjustment Gas			
	1014 Btu 0.68 sp gr nat. gas	1215 Btu 0.79 sp gr oil gas	977 Btu 0.63 sp gr oil gas	960 Btu 0.74 sp gr oil gas	1040 Btu 0.64 sp gr nat. gas	1215 Btu 0.79 sp gr oil gas	977 Btu 0.63 sp gr oil gas	960 Btu 0.74 sp gr. oil gas
AGA Flash-back Interchangeability Index I_F		1.194	1.31	1.33		1.228	1.35	1.33
AGA Lifting Interchangeability Index I_L		0.742	0.772	1.02		0.860	0.836	1.11
AGA Yellow Tip Interchangeability Index I_Y		0.55	0.696	0.845		0.606	0.767	0.935
Air theoretically required for complete combustion per 100 Btu "a"	0.938	0.926	0.920	0.832	0.958	0.926	0.920	0.832
Primary Air factor $f' = \frac{1000\sqrt{d}}{h}$	0.809	0.732	0.812	0.896	0.766	0.732	0.812	0.896
Lifting Limit Constant "K"	1.179	1.412	1.568	1.40	1.211	1.412	1.568	1.400
Yellow Tip Limit "Y"	24.2	40.4	35.6	35.8	24.8	40.4	35.6	35.8
Theoretical % change in input rate to burners		+10.9	-0.2	-9.6		+4.5	-4.0	-14.4

Calculated AGA Interchangeability Indices

Table 2 contains the calculated A.G.A. Interchangeability indices for lifting "I_L", flash-back "I_F" and yellow tips "I_Y". In addition, factors used in determining these indices and the theoretical change in burner input rating are included.

A.G.A. equations used to determine "I_L", "I_F" and "I_Y" are presented below:

Lifting Interchangeability Index:

$$I_L = \frac{Ka}{\frac{f_s\ a_s}{f_a\ a_a}\left(K_s - \log \frac{fa}{f_s}\right)}$$

Flash-back Interchangeability Index:

$$I_F = \frac{K_s\ f_s \sqrt{\frac{hs}{1000}}}{K_a\ f_a}$$

Yellow Tip Interchangeability Index:

$$I_Y = \frac{f_s\ a_s\ (Ya)}{f_a\ a_a\ (Y_s)}$$

Nomenclature for the terms in this article are as follows:—

A = air theoretically required for complete combustion, cu. ft. per foot of gas.

a = air theoretically required for complete combustion, cu. ft. per 100 Btu of gas $= \frac{100\ A}{h}$

d = specific gravity (air = 1.0)

E = total inerts in gas mixture, decimal volume

F = lifting constant

f = primary air factor $= \frac{1000\ \sqrt{d}}{h}$

h = gross heating value, Btu per cu. ft.

I_F = index of flash-back interchangeability

I_L = index of lifting interchangeability

I_Y = index of yellow tip interchangeability

K = lifting limit constant $= \frac{F}{\sqrt{d}} = \log R + 0.016L$

L = lifting limit, percent primary air

O_2 = oxygen in gas mixture, decimal volume

R = input rate, Btu per hr. per sq. in. of port area $\frac{}{10{,}000}$

T = yellow tip constant, cu. ft. of air required to eliminate yellow tips per cu. ft. of gas

Y = yellow tip limit, percent primary air $= \frac{100\ T}{A + 7E - 26.3\ O_2}$

Subscript a = adjustment gas

Subscript s = substitute (or supplemental) gas

The methods of employing these equations for prediction of interchangeability has been indicated by example calculations in various literature. (14) (19)

Interpreted Results from Table II

From Table II and from other observations, the following is indicated (assuming distribution pressures remain the same):

(a) Some flash-back complaints are indicated upon conversion* to any of the three oil gases for some burners adjusted with hard flames because of these facts: (1) I_F values for the substitute gases are equal to or greater than the limiting value reported in A.G.A. Bulletin 36 (14); (2) the K value for the oil gases are greater than the K value for the two natural gases, indicating a greater ignition velocity for the oil gases and consequently probable flash-back difficulties; (3) Flash-back limit curves show that oil gases have a greater tendency for flash-back than natural gas.

For burners adjusted with soft and normal flames on either of the natural gases, no flash-back difficulties would be expected for any of the oil gases. Occurrence of flash-back is further enhanced with decreased input rate occurring upon substitution. Computations for change in burner input rate were made on the basis that the change is directly proportional to heating value and inversely proportional to the square root of the specific gravity.

(b) Since the I_L value is equal to or less than 1.0, no lifting difficulties should occur upon substitution of the oil gases for the 1014 Btu natural adjustment gas. This would be true even for burners adjusted with hard flames on natural gas.

With the 1040 Btu natural adjustment gas, conversion to the 960 Btu oil gas only would tend to produce slight lifting because of the I_L value of 1.1. These complaints would be inappreciable, however, since they would be anticipated to occur only for a few burners adjusted with hard flames.

(c) On the basis of I_Y allowable limits of interchangeability for natural gases given in Bulletin 36, (14) the calculated I_Y indices, presented in Table II, indicate that an appreciable amount of yellow tips would occur with the 1215 Btu substitute oil gas and only slight yellow tips would be anticipated upon substitution of the 977 Btu oil gas or the 960 Btu oil gas. Yellow tips would be expected only for burners adjusted with soft flames on either of the natural gases.

An index of yellow tip formation can be obtained from the "Y" and "f" values. The "Y" value for the substitute gas should be less than that for the adjustment gas to avoid yellow tips. If this is not the case, greater air injection by the substitute gas as indicated by a higher primary air factor will help avoid yellow tips.

(d) The best interchangeable gas for either of the two adjustment natural gases would be the 960 Btu oil gas which should be able to be substituted 100% without unusual customer reaction provided burners are adjusted with soft to normal flames, preferably the latter.

(e) Appliance conversion from a natural gas to an oil gas is very inexpensive since the major adjustments necessary would be some simple air shutter changes. For some burners having non-adjustable air shutters, other readjustment means may have to be provided.

Field Results

Table III, "Operational Experience with Gas Interchangeability Problems of Oil Gas with Natural Gas," was prepared from informa-

** Throughout article the word conversion refers to substitution of a supplemental gas mixture for the adjustment gas, unless prefixed by the word appliance.*

TABLE III

OPERATIONAL EXPERIENCE WITH GAS INTERCHANGEABILITY

PROBLEMS OF OIL GAS WITH NATURAL GAS

Company No.	1	2	3	4	5	6
Type Nat. gas sendout	1015 Btu 0.68 sp. gr.	1050 Btu 0.65 sp. gr.	1025 Btu 0.67 sp. gr.	1100 Btu 0.64 sp. gr.	1000 Btu 0.68 sp. gr.	900 Btu 0.54 sp. gr. 1100 Btu 0.64 sp. gr. (Nat. gas coke oven gas)
Approx. Analysis: CH_4	74			88.0	75.0	66.9
C_2H_6	15			7.3	13.3	6.0
N_2	11			1.1	11.4	1.1
Other				3.5	0.3	(CO 1.8 CO_2 0.5 Ill. 1.8 O_2 0.5 H_2 21.4
Type Oil Gas	950 Btu	995 Btu	1100 Btu 0.73 sp. gr.	1035 Btu 0.75 sp. gr.	937 Btu 0.87 sp. gr.	860-910 Btu up to 0.69 sp. gr.
Approx. Analysis by Volume: CO		1.2		0.5	1.4	1.1
H_2		12.7	14.0	16.1	15.9	14.8
CH_4		34.1	46% (Paraffins)	42.3 (Paraffins)	22.8	41.0
C_2H_6					3.5	1.5
Ill.		28.5	27.0	28.9	27.2	17.9 +
CO_2		3.8		1.9	3.5	2.2
O_2		0.9		0.4	1.4	0.9 +
N_2		18.8		9.9	24.3	20.6
Max. % oil gas sendout with normal customer reaction	50	100	100	60 - 70	40	40 - 50 of nat. gas used
Major difficulties encountered with use of higher than max & allowable oil gas sendout	none at max	Very slight pilot difficulties with too rich oil gas. Some burner trouble when they had too narrow adjustment range	Yellow tips & leak complaints	Leak complaints some flashback & Yellow tips @ 100%	Flash-back noise of extinction, increased leak complaints increased pilot outrage	Odor complaints increased condensates
Gen. type of flame adjustment on customer appliances		Normal		Normal	soft(?)	Soft except ranges
Normal press. (inches of water) for distribution system				5 to 6	5.5	4 - 6
Variation in press. (inches of water) for distribution system				Max. 2.5 - 3.0 inches allowable by regulation.	negligible variation	worst conditions 3 - 12
Remarks:	Company has not used greater than 50% oil gas since it has been found unnecessary	with heating value of 990-1010 Btu, satisfactory conversion occured	Complaints were received from 1.4% of total customers (18)	Distribution service 3 times normal when 100% oil gas was used for short interval	No scrubbing employed	During peak load the nat. gas coke is mixed with blue gas, carburetted water gas, Hi-Btu oil & a small amount of refinery oil gas

tion received from various companies through field inspection, correspondence and technical articles.

Another company reported that they used 100% 900 Btu oil gas for 15 days on their system whose base gas is a 900 Btu mixed gas made by mixing 1040—1140 Btu natural gas with a manufactured gas which varies from a modified blue gas of 150 Btu and/or carburetted water gas of 600 Btu and/or 1000 Btu oil gas. A large amount of pilot outage and/or orifice stoppage occurred due to gum formation.

As may be noted, oil gas was employed in quantities from 40% to 100% substitution. Minor complaints occurred upon substitution which could be solved mainly by simple air shutter adjustment.

In the case of Company 4, Leon Willien reports (20) that complaints were classified as follows:—

Leaks	29.1%
Flash-backs (water heaters)	10.2%
Yellow Tip Flames	59.7%
Miscellaneous	1.0%

Leak calls were responsible for a considerable proportion of the total service calls for most companies. These leaks in general are insignificant and were unnoticed with natural gas; however, because of the penetrating, pungent and unfamiliar odor of the oil gas, typical of manufactured gases, complaints occurred. These difficulties will probably be minimized after customers become accustomed to the oil gas odor. There can be some serious question as to whether the location of these leaks should be avoided. In fact, it might well be argued that such identification of leaks is desirable. It appears worthwhile, nevertheless, to investigate the possibility of altering the odor of oil gases by addition of commercial odorants.

Flash-back or noisy extinction was encountered on certain burners where the port area per unit Btu input was large. Yellow tips, of course, will occur where primary air entrainment is low because of the small opening of the air shutter due to its adjustment or clogging or because of improper burner design. Yellow tipped flames with oil gas may not be objectionable, that is, combustion characteristics may be satisfactory and sooting will not occur. (18)

However, in readjusting, it is best to be on the safe side by eliminating yellow tips whenever possible. Yellow flames should be avoided, especially for pilots since sooting on pilots may cause automatic pilot failure.

It is interesting to note that several companies have indicated that normal flame adjustment on natural gas was best before conversion to oil gas.

A discussion of complaints occurring on certain types of appliance burners is given by L. J. Willien in his article "Stand-by Gas." (20)

It has been reported that oil gas has a deleterious effect on certain diaphragm materials and hence replacement may be found necessary in some cases.

Interchangeability from a Standpoint of Gas Analyses

The oil gas which has been indicated as the most satisfactory substitute for natural gas had one major characteristic different from the other oil gases; namely, a high N_2 content. Inerts, in general, have the tendency to reduce flash-back for oil gases.

A high illuminant content, of course, will tend to lead to yellow tip formation and hence a low illuminant content is desirable.

A high hydrogen or acetylene content will tend to cause noisy extinction and flash-back; hence, a composition low in both constituents is desirable.

A high paraffin content will be desirable since these gases are desired to simulate natural gas.

Plant Operation to Obtain a Desired Oil Gas

As the heating value of the oil gas decreases (800 Btu limit) the methane and H_2 increase and the illuminants decrease. (21) This heating value decrease could be effected by raising the operating temperature or by lowering the make oil rate.

Olefins in illuminants have been shown to decrease with heating value decrease which would tend to indicate that higher cracking temperatures would produce lower Btu gases that may be more acceptable as natural gas substitute (12). Decrease of the C_4+ group in the illuminants occurred with decreased cracking or higher heating value. (12) However, this may be dependent on the atmosphere in which cracking occurs since other unpublished data indicate the reverse.

The C_4+ group may contain a high percentage of benzene and/or other aromatics which are the worst offenders from the standpoint of yellow flame formation. Proper oil gas scrubbing operation should be employed which will remove most or all of these objectionable materials.

The degree and extent of cracking of gas oils under various conditions are well taken up by Hugh E. Ferguson. (21)

Interchangeability from a Standpoint of Heating Value and Specific Gravity

In general, gases are more interchangeable when input rate to burners remains the same. Accordingly, since input rate is proportional to the factor $\frac{h}{\sqrt{d}}$, this factor should preferably be equal for adjustment gas and substitute gas. Since primary air entrainment is proportional $\frac{\sqrt{d}}{h}$,* or the reciprocal of the above, primary air aspiration should be equal when the factor $\frac{h}{\sqrt{d}}$ are equal for substitute and adjustment gases.

These above facts were employed in both Knoy Interchangeability index and the first factor of the A.G.A. "C" Interchangeability index. Although use of the factor $\frac{\sqrt{d}}{h}$ does not take into consideration the gas composition, nevertheless it is a quick and easy means for determining whether a gas is likely to be interchangeable for another gas.

Mr. Willien has indicated that the specific gravity and chemical composition of a high Btu manufactured gas rather than its Btu are the determining factors in the ability to use such a gas as a substitute for natural gas. Also the best substitute is an oil gas having the same specific gravity as natural gas. (20)

The specific gravity of an oil gas is dependent on its heating value (18) so that if either is given, the other can be estimated.

It is apparent that for conversion to oil gas, greater primary air entrainment should occur for oil gas than for natural gas as indicated by the fact that primary air for both lifting and yellow tip limit curves are about 20% lower for natural gas than for oil gas. Accordingly, the primary air factor $\frac{\sqrt{d}}{h}$ should preferably be greater for oil gas than for natural gas.

The distribution pressure has been assumed to be constant when conversion occurs, which it normally is. Any increase in pressure will, of course, increase the burner input rate (rate proportional to square root of pressure) and will have to be compensated. Primary air entrainment in general is not changed to any extent with pressure change. Accordingly, the compensation will have to be applied mainly to correct for burner input rate change. As may be noted by Table 2, substitution of oil gas for natural gas may cause a slight decrease in burner input rate and hence a slight increase in distribution pressure will be beneficial. Burner input rate change of $\pm 10\%$ and even higher can normally be tolerated without any unsatisfactory burner performance, so that some pressure variation is allowable.

Decrease in input rate will enhance flash-back tendencies and will increase cooking time. Increase in input rate may cause tendencies for flame streaming and lifting.

** Primary air injection is referred to throughout as the amount of primary air injected expressed as a percentage of air theoretically required for complete combustion.*

Other Interchangeability Indices

A quick and easy means of determining interchangeability is through an interpretation of the factors $\frac{h}{\sqrt{d}}$, $\frac{\sqrt{d}}{h}$, "K" and "Y" factors for adjustment and substitute gases. The ignition velocity of the constituent gases in the adjustment and substitute gases, as well as the ignition velocity for the latter two gases, are also important factors to be considered.

These values can be determined or estimated from data available. (14) (15) The interchangeability equations for lifting, flash-back and yellow tips may be used if desired by employing the estimated factors "a", "f", "K" and "Y" as obtained from similar gases.

Although it is not in the scope of this article to discuss various interchangeability formulae, it is worthwhile to mention that many others do exist such as the Knoy, AGA "C" and Cutler-Hammer indices. Each has found use in the past and although they have limitations, some engineers still employ them to some extent. A good review of the subject of interchangeability of fuel gases is given by Jesse S. Yeaw in Gaseous Fuels (19).

The maximum allowable limit of supplemental gas addition to the base adjustment gas will be determined most reliably, when practical, by suitable laboratory tests on a group of representative appliance burners.

A.G.A. Allowable Index Limits

The A.G.A. allowable interchangeability indice limits for lifting, flash-back and yellow tips are not theoretical values but only empirical values determined through numerous tests on certain appliance burners with a large number of gas mixtures.

It should be emphasized that allowable indice limits should be chosen whenever possible which will be consistent with the A.G.A. allowable indice limits determined for gases simulating those employed in the particular interchangeability problem being studied.

Conclusions

1. A 960 Btu, 0.74 sp. gr. oil gas or one similar in composition to this gas may be employed satisfactorily with complete substitution for a typical natural gas.

2. Field results also indicate that oil gas with the proper composition can be substituted 100% for natural gas satisfactorily, although complaints greater than normal customer reaction will occur initially upon substitution unless uniform and normal flame adjustments are made for appliance burners on natural gas before conversion takes place.

3. Service calls due to the customers' complaints will require usually only a simple adjustment of air shutter setting.

4. Difficulties mostly encountered with appliance burners upon converting to oil gas from natural gas are likely to be as follows in decreasing order: Leakage (or odor complaint), yellow tips and flash-back.

5. Appliance conversion to oil gas from a natural adjustment gas is inexpensive since the service department of a gas utility should be able to handle any necessary burner readjustments.

6. Interchangeability problems require experienced interpretation. Personnel of The Gas Machinery Company will be glad to assist or advise you regarding any interchangeability problem you may have.

7. Some flash-back and yellow tips may both possibly occur simultaneously with oil gas for different burners in the distribution system due to having both too hard and too soft flame adjustments with natural gas. This, of course, will not occur when normal and uniform air shutter adjustments exist.

8. Some flash-back and yellow tips may occur on different burners due to improper operation of the oil gas set during the day. With a set too hot a high H_2 concentration is apt to occur, causing flash-back difficulties. With an operation temperature which is too low, (perhaps upon initiating operation) a high illuminant content may result causing yellow tip difficulties.

Part 2 of this article "Interchangeability Characteristics of Oil Gases" will consist of the Interchangeability of Oil Gas-Diluent Gases with Manufactured Gases," dealing mainly with air as the diluent gas.

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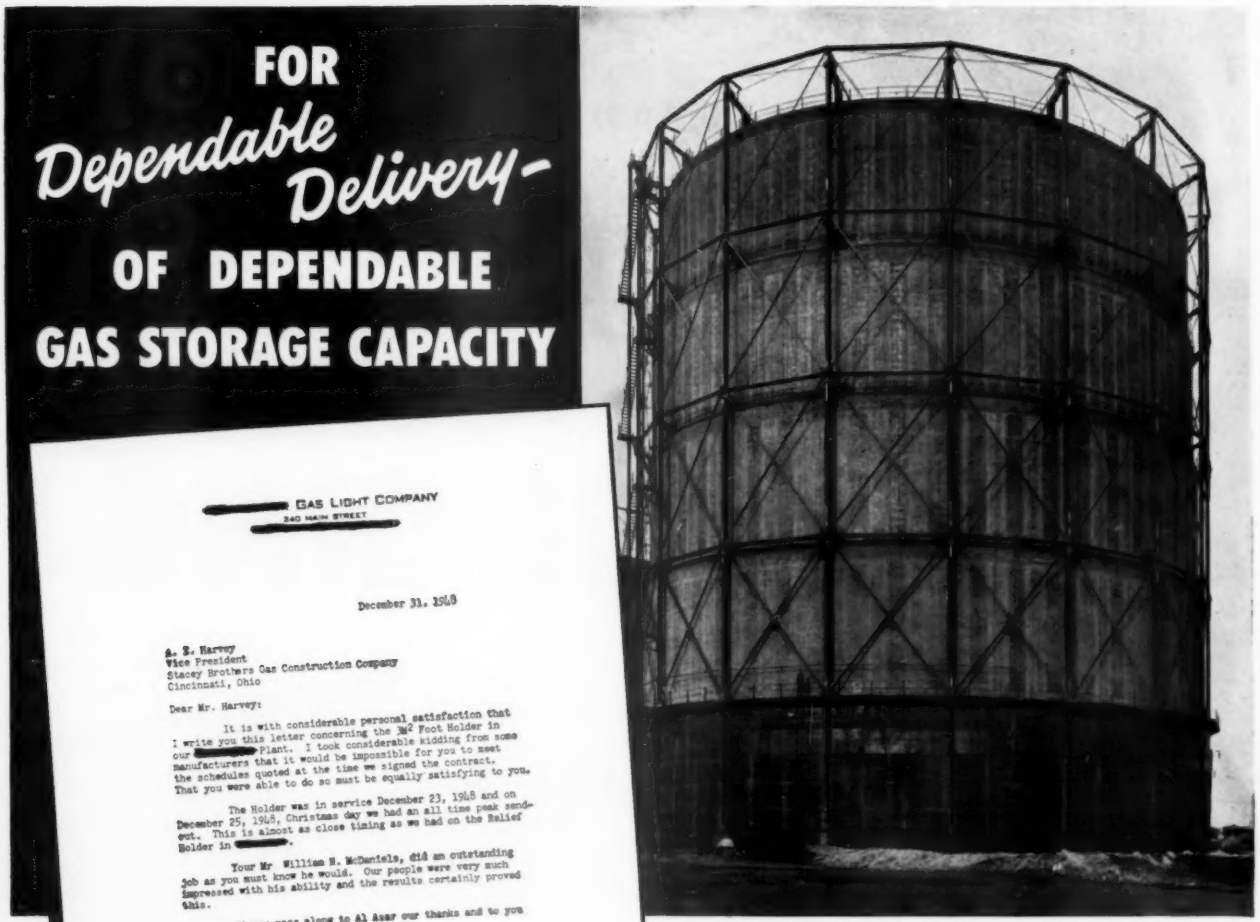
(Concluded on page 50)

FOR *Dependable Delivery*— OF DEPENDABLE GAS STORAGE CAPACITY



[redacted] GAS LIGHT COMPANY
240 MAIN STREET [redacted]

December 31, 1948

A. E. Harvey
Vice President
Stacey Brothers Gas Construction Company
Cincinnati, Ohio

Dear Mr. Harvey:

It is with considerable personal satisfaction that I write you this letter concerning the [redacted] Foot Holder in our [redacted] Plant. I took considerable kidding from some manufacturers that it would be impossible for you to meet the schedules quoted at the time we signed the contract. That you were able to do so must be equally satisfying to you.

The Holder was in service December 23, 1948 and on December 25, 1948, Christmas day we had an all time peak send-out. This is almost as close timing as we had on the Relief Holder in [redacted].

Your Mr. William H. McDaniels, did an outstanding job as you must know he would. Our people were very much impressed with his ability and the results certainly proved this.

Please pass along to Al Asar our thanks and to you again.

Best regards for the New Year.

Very truly yours,

[redacted]
Vice-President

[redacted]

Another 3,000,000 Cubic Foot STACEY BROTHERS All-Welded Panel Wet-Seal Gas Holder

The letter speaks for itself—an actual, unsolicited testimonial of Stacey Brothers *service*.

Ability to meet contract delivery dates comes only as a result of long years of design, fabrication and erection experience—and we've had more of it than any other supplier.

Since we first introduced our patented All-Welded Panel design, we've built more than 100,000,000 cubic feet of holder capacity—78 holders over 100,000 cubic feet in size, including the world's largest (10,000,000 cubic feet)—and a whole host of smaller ones.

The service you get from a Stacey Brothers holder doesn't stop when the contract erection date has been met—it *starts* then. All-welded construction gives longer life, greater freedom from rust, fewer repairs, lower maintenance costs, less down time. Prove it to yourself by inspecting a Stacey Brothers holder installation—there's one near you. May we give you the name and location?

STACEY BROTHERS GAS CONSTRUCTION CO.
One of the Dresser Industries
5535 VINE STREET • CINCINNATI 16, OHIO

For an interesting illustrated 50-page catalog on Stacey Brothers Patented, All-Welded Panel-Type Holders, write for Bulletin W-45.

Stacey Brothers
ALL-WELDED GAS HOLDERS

TODAY'S MARKET DEMANDS CREATIVE SELLING

and that means

DOORBELL RINGING!

Third Quarter "Ring the Bells of Freedom" Campaign rewards your most successful doorbell-ringers in April May, and June

Right now you're on the threshold of your biggest Servel Gas Refrigerator selling season. Records show that almost 43 per cent of annual refrigerator sales are made during April, May, and June.

But you're well *over* the threshold of *the buyers' market!* It's back in full force. People have stopped reaching for products. Their buying habits are changing back to normal again. Today they won't buy without being *sold* first. This calls for just one thing on your part—*a creative selling job on the Gas Refrigerator.* This means you must put your salesmen to work to create sales . . . send them out to find prospects . . . and be sure they're trained and equipped to sell convincingly once they've uncovered a prospect.

Every sales manager knows the best way to have this job done . . . AND THAT'S BY RINGING DOORBELLS! That's why the doorbell has been chosen as the theme of the Third Quarterly Campaign of the Flame of Freedom Program.

With the "Ring the Bells of Freedom" Campaign comes *extra* cash incentive—monthly cash awards in addition to the quarterly cash awards. And don't forget, all the sales made during the Third Quarter will have a lot to say about which Gas Refrigerator salesmen, gas company representatives, distributors, and dealers take off on the Victory Vacation Flight to Mexico City next October. Check your "Ring the Bells of Freedom" Portfolio for full information.

THE FLAME OF FREEDOM PROGRAM

Sponsors—The Committee on Gas Refrigeration of A.G.A. and G.A.B.A.

Donor of all awards—Servel, Inc., makers of the Servel Gas Refrigerators

STAYS SILENT . . . LASTS LONGER

Servel

The GAS Refrigerator

Realistic Dealer Participation Pays Off

By

James F. Howley

Manager-Dealer Relations
The Brooklyn Union Gas Co., Brooklyn, N. Y.

IT IS A PRIVILEGE and a pleasure to have the opportunity of talking about the dealer to this group who so ably guide the sales destinies of a vast segment of our industry.

As you will note from the program, the title of my address is "Realistic Dealer Participation Pays Off." This topic was suggested by your chairman, Mr. Raymond Little. I like it for the following reasons:

First, I like "participation" because the word "cooperation" is a cold word . . . not many people like to cooperate but everyone likes to participate.

Second, because I am sure that some form of dealer participation is desirable if a gas company is to assure truly broad coverage in the sale of appliances. I believe this, not only because of the business which they bring in themselves but also because they are a source of excellent leads which stimulate the gas utility's merchandising efforts. This is particularly true of plumbers, of whom I shall say more later.

I recognize, of course, that there is no one single plan which can be adopted by a given gas utility company in view of different conditions which exist in various sections of the country. Because of this, we can only present broad principles which will guide us in our individual localities, but it is obvious that our industry must utilize every means at its command to improve and develop closer relationship with the dealers of the nation if we are to maintain and increase our gas loads.

We will promote our own self-interest if we see to it that the thousands of gas appliances merchandised annually through dealers are *good* appliances. It must be a major part of our efforts to insure that the present widespread acceptance of gas as a fuel continues and expands.

Few cooperative plans will endure for long unless the interests of both parties are served. Just what are these interests?

The *Gas Company* wants to secure all possible outlets for its fuel to control and increase its gas load. These are apparent objectives. But there are indirect ones too. It wants to insure that the appliances using its fuel are durable and safe and that they will operate economically. The future is secure for the utility that works for these things. Why? Because immediate profits will rise and good customer relations will be guaranteed.

The *Dealer* has his interests too. He wants to make a profit, as is his right. Beyond that, he, too, wants to insure his future business—which he does through gaining his customers' good will.

The realization of these basic fundamentals at the inception of any cooperative effort with the dealer will smooth the road to the organization of an effective and profitable dealer participation plan. We must realize that in the last analysis, the dealer does not care one iota whether the appliance or equipment he sells uses gas, coal, oil, electricity, atomic energy, or whether you have to rub two sticks together to make it work, so long as it has customer acceptance and so long as he can sell it at a profit!

During the past 20 years, it has been my pleasure to work very closely with the dealer, and with very few exceptions, I have found him to be a human being, exactly as you and I. He has his personal problems and his headaches, and last, but by no means least, he has a living to make—a living for himself and his family.

There is no magic formula for a successful dealer participation plan. There is no hocus-pocus or the hand is quicker than the eye stuff . . . but merely a recognition on the part of the gas utility company that the dealer is in business to make money, even as you and I.

Now, as a famous politician once said . . . "Let's take a look at the record." Statistics prove that nationally, the dealer accounts for the vast majority of household appliance and equipment sales. That the dealer will be an ever-increasing factor in the scheme of appliance merchandising is self-evident. This is due to many factors but I will just name a few.

First, convenience. In a great many instances the dealer's store is in the close vicinity of the prospective purchaser.

Second, friendship. Many times the dealer's wife belongs to the same bridge club or sewing circle.

Third, the desire of many people to help the "little man" get along in business, and

Fourth, the feeling on the part of the consumer that the gas company is a hard-boiled, million-dollar corporation and so they would rather take their business somewhere else.

Now that we have recognized that the basic principle in a successful dealer participation plan is the recognition that the dealer is only concerned with profit and how he can make more profit by working with the local utility company and the manufacturer, let's take a look at some of the responsibilities on the part of—

First, the Utility
Second, The Gas Appliance Manufacturer, and
Third, the Gas Appliance Dealer

Time does not permit me to discuss them all in detail but I think that the following are of primary importance:

Responsibilities of Utilities:

(1) To provide community leadership in the promotion of high quality gas appliances.

(2) To encourage and assist manufacturers in establishing adequate local outlets.

(3) To design a local Dealer Participation Plan that will provide *equal* selling opportunity to manufacturer, distributor, utility, and dealer.

(4) To develop local installation specification specifications for gas appliances.

(5) To make available sales and service training programs for dealers.

Presented at the Eastern Natural Gas Regional Sales Conference, Pittsburgh, Pa., March 15th, 1949.

(6) To see that adequate facilities are available in the local market.

Responsibilities of the Gas Appliance Manufacturers:

(1) To manufacture gas appliances of high quality, attractive styling, and modern features equal or superior to competitive appliances in all respects, and at a price which represents profit opportunities to the Dealers and good value to the customer.
(2) To cooperate with and assist the local utility in all phases of its Dealer Participation Plan, including advertising, promotional, and sales assistance.
(3) To provide each suitable trading area with adequate distribution facilities and develop a strong Dealer organization.
(4) To provide Dealers with effective product sales training and displays.
(5) To assist the Utility to establish local installation specifications and service practices.

Responsibilities of the Gas Appliance Dealers:

(1) To promote and sell high quality gas appliances in such quantities so as to justify continued support by the utility and the manufacturer.
(2) To cooperate with the utility in its Dealer Participation Plan and all local cooperative gas appliance promotion.
(3) To maintain an adequate showroom including, where possible live displays of gas appliances and to staff it adequately, preferably with both floor and outside sales personnel.
(4) To attend sales meetings and training sessions on installation and servicing.
(5) To participate in advertising programs sponsored by the utility and the manufacturer.

Again, I wish to reiterate that there is no one set plan which can be devised or successfully applied to cover the numerous local conditions and situations which exist throughout the country . . . but I believe you will agree that one or more of the factors which I have just mentioned can be applied in practically every section of the country.

And now, I would like to discuss briefly with you the organization, objectives, and results of my company's dealer plan:

So that you will have a clear understanding of our situation, The Brooklyn Union Gas Company has 2,248 miles of mains supplying 830,000 meters in a territory covering 105 square miles in the Boroughs of Brooklyn and Queens and is an all Gas Company.

Our company supplies a population estimated in excess of 3,000,000 and is one of the largest individual gas companies in the country.

We have 780,000 domestic accounts, which includes 22,000 house heating accounts.

140,000—1-family
162,000—2-family
164,000—3 to 6-family
314,000—In Large Apartment Houses

Total 780,000
45,000 commercial
5,800 industrial

Brooklyn has a fair sized industrial center and the New York Navy Yard is supplied with gas from our mains.

In June of 1929, Mr. H. H. Cuthrell, Vice President of our company, who I am sure you all know, was appointed Manager of the New Business Department. In his previous capacity as Superintendent of Shop Distribution, he had organized the present Customers Service Department. As part of this re-organization plan he had met with the representatives of various plumbing associations and reached an agreement under which all work on gas piping beyond the service valve, except connecting and disconnecting meters and the temporary repair of leaks, would be done by licensed plumbers; in addition, it was agreed that the connecting of appliances sold through the company would be done by them at prices mutually agreeable which would be part of the price of the appliance quoted to the consumer.

I tell you this because it has a direct bearing on the cooperative merchandising plan of our company and the attitude of the plumbers toward our efforts to increase appliance sales, as this agreement went a long way toward receiving their support.

Our admission that all work on gas piping within the building whether new or old, was definitely in their field of operation had a vital effect on their attitude toward us. They stopped looking upon us as competitors.

By agreeing to standard prices for connecting appliances sold through us and which we would collect from the customer and pay to them, they were assured of being paid and relieved of competing against each other. To give you an idea, the amount of money paid by my company to plumbers during 1948 for connecting appliances only, was $366,857.01.

First, I would like to point out that there are some 3,000 licensed plumbers in *Greater New York*, anyone of whom is eligible to participate providing the customer for whom he wishes to purchase and install an appliance is supplied by our mains.

Out of the 3,000 licensed plumbers, there are between 800 and 1,000 in our territory with whom we do business each year.

Let me, at this point, give you the salient features of the plan.

Leads

Dealers are urged to turn in leads, on prospect forms furnished them by the company, for follow-up by our own sales organization. Good leads are important as in most cases, the plumber has knowledge of a breakdown or other conditions which we, as a utility, would know nothing about. For what is more natural if a member of the household discovers water, gas, or steam leaking, than a call the nearest plumber. His recommendation in nine out of ten cases, as to what should be done, will be accepted and whether he calls in the gas man, stoker salesman, oil man, or just repairs the damage will depend on how he feels toward each of these people. Where sales are closed on this basis, the average remuneration to the dealer is 10%. If the dealer chooses to close the entire transaction and the merchandise is sold on the deferred plan, the average amount paid to the dealer is 20%. He may also purchase equipment from our company at as high as 25% discount and resell it to his customer. In such cases, it is, of course, necessary for him to collect his money from the customer to whom the sale is made.

These discounts are based on the retail selling price of the appliances, less the connect charge.

All appliances sold by us through dealers are warehoused and delivered direct to the customer by our company at no additional charge to the dealer.

All time payment sales are financed by our company without recourse.

In arranging price schedule for connecting appliances, specifications are laid down by our company and are incorporated in a book which is furnished to all licensed plumbers in our territory so that connections will be uniform in all cases.

At present, the price paid for connecting ranges is $7.50; for refrigerators, $10.00 for a box sold at retail, $9.00 for the first and $8.00 for subsequent boxes delivered at one time to the same operation (apartment house); and $30.00 for automatic storage water heaters.

As you may know, our company discontinued the sale of house-heating

in November 1946 until further notice but upon resumption of the sale of such equipment, prices for connections will be negotiated with the plumbers as before.

Where it is thought advisable, merchandise is consigned to dealers for display purposes only, providing the dealers' premises are in the territory supplied by our mains. At present, there are 153 display dealers. Literature and sales helps, such as display cards for windows and floors, are furnished by the company without charge.

Where appliance manufacturers have special advertising signs and show pieces for which there is a charge, the company arranges to secure them at a price which will be attractive to dealers and retails them through our Publicity & Advertising Department.

Company salesmen call on the dealers in their respective territories as often as possible and assist them in making sales. On dealer sales, our salesmen receive sufficient compensation to stimulate them in this activity.

The company maintains eight branch offices—at each of these offices there is a District Sales Manager in charge of retail sales.

Dealer meetings are held, from time to time, at various offices, at which they are instructed in merchandising activities and kept apprized of any campaigns or drives which might be conducted.

Meetings for Department Store salespeople are held in our Home Service auditorium for the purpose of improving their sales presentation.

Service and Payment Depots

Some years ago, in order to establish a convenience for customers living in sections of our territory remote from branch offices and to avoid opening offices which would tend to compete with our dealers from a merchandising standpoint, we made agreements with certain plumbers to accept the payment of gas bills and service orders. This arrangement proved so satisfactory to the dealer, consumer, and the company that we now have established at 22 of our dealers' premises, under Special Agreement, tellers' cages, manned by our own employees, to accept orders for service and collect gas and appliance bills.

Dealers are not compensated for this activity but are able to increase their sales because our consumers use their places of business as a convenience in transacting business with our company.

So that you may have an idea of this activity, during 1948, 1,313,233 gas and appliance bills were collected and 3,389 sales of major appliances made in these 22 locations.

The company advertises in the leading plumbers' trade publications and our representatives attend social affairs of the various plumbers' associations. We also publish a paper known as the Dealer's Choice.

The company advertises in the leading plumbers' trade publications and our representatives attend social affairs of the various plumbers' associations. We also publish a paper known as the Dealer's Choice.

Water Heater Campaign

So much for the salient features of the plan. Now, I would like to tell you of a particular merchandising activity of 1948 in which the dealers played a prominent part and which, I think, demonstrates the value of dealer participation and cooperation.

Sales of automatic storage water heaters in previous years averaged 3,400.

We organized a campaign known as the "Magic Carpet Prize Thriller Campaign" for the sale of automatic storage water heaters. Merit Points

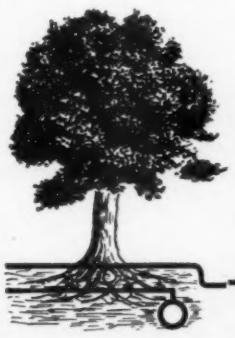
CLEVELAND

"A" TYPE METERS
"B" TYPE METERS
DIAPHRAGMS

Cleveland Gas Meter Co.

ESTABLISHED 1875

2009 Rockwell Ave., Cleveland 14, O. Phone CHerry 2351



Vegetation Surveys

NOW is the Season to arrange for inspection of distribution lines to detect leakages.

Our fully trained personnel is at your service. We can submit a complete report covering locations, source of leaks, severity of the condition and vegetation affected. We can cover any section of your lines or the complete system working on a per diem basis.

Write us regarding rates and schedules.

VEGETATION SURVEY ASSOCIATES
53 Park Place, N. Y. 7, N. Y.

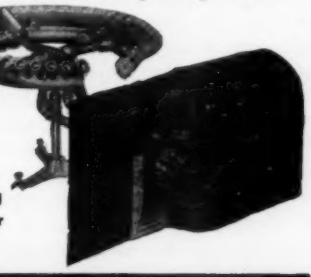
"The Gem of Them All"
COLUMBIA CONVERSION GAS BURNERS

More Popular Than Ever
With Home Owners and Dealers

DEALERS SAY—Columbia Nutipe Burner has a common sense design. Closely duplicates operation of appliance when solid fuel was used. Easy to install. Seldom requires service.

HOME OWNERS SAY—Gives quick heat transfer and earlier delivery of heat to rooms. Has tamper-proof controls and quiet operation.

MODEL P-ZE
shown here is designed for use in warm air furnaces or round type boiler where grates are removed.



Send for free folder giving complete instructions for installing

THE COLUMBIA BURNER CO.
729 Ewing Street · Toledo 7, Ohio

were established per heater and handsome merchandise prizes offered for Points gained.

Announcements were sent to dealers that meetings of interest to them were to be held at our branch auditoriums. The aid of several of our personnel, men and women, was solicited and they hired costumes and dressed as Swami and Slave Girls. The Swami was equipped with a crystal ball by means of which he was able to foresee future sales (all furnished to him beforehand by the Sales Manager), the hall was decorated, incense burned, (I can still smell it) so that the entire atmosphere gave the effect (or should I say reeked) of the Orient.

Attractive mailing pieces were purchased and mailed during the period of the campaign which ran from April 1 to October 16.

Pep meetings, at which there was professional entertainment, and door prizes were given, were held at intervals; standings of dealers were mailed to them every two weeks and 5,523 heaters were sold during the contest period. In all, 7,332 water heaters were sold during the year. This broke all sales records by far. Of these total sales, dealers sold 4,842, or 66.1%.

At the close of the contest, meetings were held at which prizes earned were awarded.

I think that you will agree that without the aid of dealers (which constitute a potent selling force compensated on a strictly commission basis) the company would have to increase its own sales personnel materially to accomplish these results.

Competition

While this talk is on the subject of dealer participation, I would like to digress for just a moment and discuss with you a matter which I believe is of vital importance to you and to me. Our competitors are making serious inroads in our domestic market as evidenced by the growth of sales of electric water heaters and electric ranges during the past several years. I think you will agree that these appliances have had to be sold and apparently some of our competitors have out-stripped us in the training of their utility sales personnel, and in organizing and training an increased number of dealer outlets.

Insofar as my company is concerned, our sales force is approximately up to pre-war strength but unfortunately, this situation does not exist in our industry as a whole. It is estimated that, nationally, gas company sales personnel is far below pre-war strength.

A Buyer's Market

We are now in the midst of a buyer's market. The days of "walk-in" sales and "How much is it? I'll take it!" are gone forever. If we are to survive and progress, we must organize and train our gas company sales personnel—we must work closer with the dealer than ever before—we must assist in training the dealer and his salesmen to really sell gas appliances—and we must do these things right now!

In conclusion, it is my firm belief that gas utilities must undertake and continue full responsibility for leadership in gas appliance sales in their respective communities to the end that the inherent superiority of gas as a fuel shall be maintained.

Aiding the Dealer

The dealer is, of course, a valuable and potent ally and I would like to suggest for your consideration, a number of vital factors which you—as the gas company—should bring vividly to his attention:

(1) The profit opportunities in the gas appliance field.

(2) Quick capital turn-over and minimum warehouse requirements by reason of the tremendous acceptance of modern gas service.

(3) The replacement market. As you all know, there are more than 10 million gas ranges over ten years old.

(4) Powerful advertising and merchandising support.

(5) Personalize your relationship with your dealers. Be sure that your dealer men visit them at frequent intervals.

(6) Speaking of personalizing, consider the idea, particularly in small areas, of running a picture of the dealer and his store in your own gas company advertising; point out that he is one of your dealers and that the consumer will find modern gas appliances on his sales floor.

(7) Make sure that your manufacturers supply the dealer with modern and effective display material so that the gas appliance has a prominent place on his sales floor and is not tucked away in some remote location.

(8) Get your dealers together from time to time; have one of your executives talk with them and announce new programs and campaigns.

(9) Consider the idea of arranging for an attractive insignia for use on the dealer's floor or in his sales window identifying him with your company.

(10) Home Service Department activities may be designed to include assistance to the dealer. Schools may be held in Dealers' showrooms and Home Service demonstrations may be provided for Dealers' appliance sales in customers' homes.

(11) Many utilities are utilizing a Dealer publication, edited particularly for their local retailers. The contents cover a variety of subjects, principally what is happening locally in gas appliances merchandising. Success stories and pictures of local Dealers are included and such publications have been well received by the Dealers.

(12) Copies of the publication *"Gas Appliance Merchandising"* are being sent to many Dealers throughout the country through the courtesy of the local utility company.

(13) Utility companies can assist dealers in arranging effective appliance displays, including layouts, floor plans, etc.

(14) Last, but by no means least, find time to get out in the territory yourself and talk with dealers, inviting them to discuss their problems with you and with your dealers' representatives.

If you are to be successful, it is well to bear in mind that you are in for a job that requires constant training, constant supervision, a tremendous lot of hard work, and a well developed program extending over not 6 months or 1 year but over a period of years.

These are some of the primary requisites to a successful dealer participation plan. Their understanding by the manufacturer, utility, and dealer cannot help but result in the achievement of our common objective in convincing all of our customers that . . . *Gas Has Got It.*

We, in Brooklyn, have developed a dealer participation plan that pays off and so can *You and You and You.*

Brooklyn Borough Gas Co. Elects Jeffords as Head

Walter M. Jeffords Jr., a director, has been elected president of Brooklyn Borough Gas Co. to succeed Miss Mary E. Dillon, president for the last twenty-three years and in service with the company for more than forty-five years. Miss Dillon will remain as a consultant.

Karl B. Weber was elected vice-president in charge of manufacturing and plant operations. He comes to the company from New York Steel Corp.

Recent Court Decisions
Affecting Gas Utilities

Liability of Gas Company for Contracts Made by Officials and Employes

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

NOT LONG AGO the president of a gas corporation wrote as follows: "Please give a legal rule so that I can know when our corporation is liable for contracts made by our officials? Also, when is a corporation's official himself reasonally liable on contracts he makes for the corporation? One of our officials now has such a suit to defend. Can you assist him to win the suit?"

First, it is well to explain that a corporation official who makes a contract in his own name, without disclosing the identity of the corporation he represents, renders himself *personally* liable unless the testimony proves that the *mutual intentions* of the contracting parties was that the official should *not* be personally obligated on the contract.

For example, in A. A. Electric Company, Inc., v. Block, 193 S. W. (2d) 631, the testimony showed facts, as follows: Mr. White was president and manager of a corporation. He purchased a considerable quantity of equipment and merchandise for the corporation which the seller charged *personally* to White.

In subsequent litigation White contended that he was not personally obligated to pay for the merchandise because it was utilized by the corporation.

The higher court held White personally liable to pay for *all* of the purchased merchandise. This court explained important law, as follows:

"An official or agent who would avoid personal liability on a contract entered into by him on behalf of his principal has the legal duty to prove not only the fact that he was acting in a representative capacity, but also that the identity of his principal was disclosed to the other party before the contract was made."

Broad Liability

Modern higher courts consistently hold that a gas corporation official is *personally* liable on contracts he makes for the corporation although the other contracting party *knows* that he represents the corporation: (1) where he makes a false statement or representation of his authority, with intent to deceive; (2) where he knowingly makes a false statement or representation, without intention to deceive; (3) where he does a damaging act believing he has authority, but actually has none; (4) or where he acts on authority from his superior and does an unlawful act. (See Tripp v. Bell, 78 S. E. (2d) 126.)

In order to avoid personal liability on contracts made for corporations the officials and employes must be certain to avoid violating this rule.

Does Not Bind Corporation

Another important legal rule is that an official or employe may be personally liable on a contract for the corporation if his affixed signature *does not* clearly bind the corporation, and the other party to the contract believes that the official is *not* acting for the corporation. On the other hand, a corporation official never is liable on a contract signed for the corporation, if the testimony shows that the other party *knew* that the official *intended* to obligate the corporation.

See Thompson v. Blackwell, 56 Ky. 490. This court held an official *not* personally liable on a contract which he signed: "George W. Williams, G. W. P." The testimony proved that at the time the contract was signed the other party *knew* that Williams intended to represent the corporation. Of course, Williams was compelled to prove the facts, or he may have been held personally liable on the contract.

Also, see Wilson v. Carnation Company, 287 Pac. 50, where an official signed a note without including the name of the corporation. However, it was understood that the corporation and *not* the official was to be liable.

Later the holder of the note attempted to collect the amount of the note from the official. The higher court held the corporation liable on the contract, saying:

"The fact that this contract was 'accepted' by the company's manager without adding after his signature words indicating his representative capacity does not, when considered together with all the other facts shown by the record, require a holding that the loan was not made to the company."

For comparison see the leading case of Tucker Company v. Fairbanks, 98 Mass. 101. Here a contract was signed by an employe who failed to prefix either the word "By" or "For." Moreover, the name of the corporation did not appear in the body of the contract. Therefore, the court held the employe personally liable on the contract, because he could not convince the court that at the time he signed the contract the other contracting party knew that the corporation was being represented.

In view of the dangerous consequences when gas corporation officials sign contracts, it is well to know that an official is relieved of all risk of personal liability on contracts, or other papers, which he signs with proper authority for a gas corporation provided: the name of the corporation appears in the body of the contract; and the official's sig-

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Spring Top operates pointing either up or down

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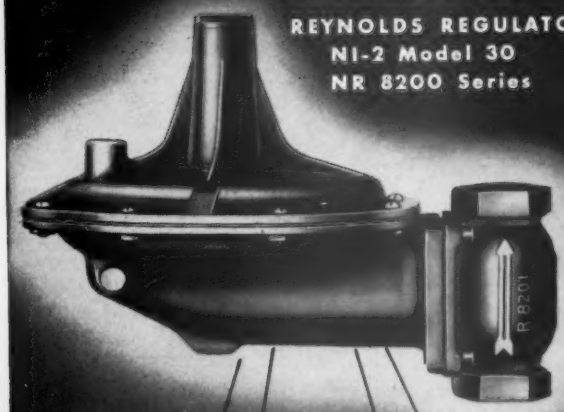
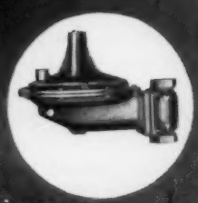
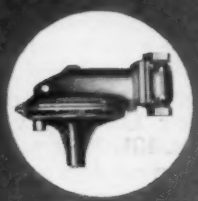


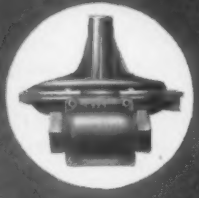


Vertical Position with down flow

Vertical Position with up flow



Inverted Position for use where accumulation of water is problem



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2. Quickly installed in existing house piping.
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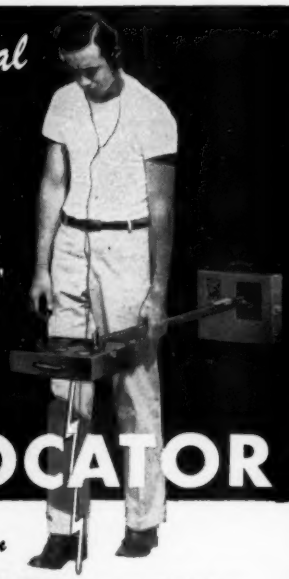

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HY-13b

EARTH BORING TOOL

nature is preceded by the word "By," "For," or "Per." Obviously this law is *not* exclusively applicable to fraudulent transactions by corporation officials. The same law is effective with respect to *all* others who sign contracts or obligations.

For comparison, see Pacific v. Modern, 290 Pac. 859. The facts of this case are that a corporation's general manager rendered a false financial statement for the purpose of inducing creditors to extend credit to the corporation. The corporation's president knew that the false financial statement was rendered. Later the corporation became insolvent and the creditors filed suit against *both* the manager and the president for the amount owned by the corporation.

The lower court decided (1) that the financial statement was made for the purpose of securing credit for the corporation; (2) and that it was made by the manager and with the knowledge and consent of the president. Hence, the higher court held both the manager and president liable, personally.

On the other hand, in order that readers shall thoroughly understand various phases of the law on this subject, it is well to know that no official of a corporation can be held personally liable for the corporation debts, on the basis of a false financial statement, unless the testimony proves *conclusively* that the creditors relied *exclusively* upon the financial statement when extending the credit.

For illustration, in the leading case of Cohn v. Brodhead, 71 N. W. 747, it was shown that a report made by a mercantile agency, such as Duns or Bradstreets, contained *not only* positive false statements made by a corporation official, but also *in addition* the report contained opinions of the financial worth of the corporation given by the mercantile agency itself. Credit was extended to the corporation on the basis of the entire statement and *not* solely on the fraudulent statements made by the corporation's official. Also, the evidence disclosed that the creditor did not rely solely upon the official's false statement when extending credit.

In view of these facts the court held the corporation official *not* personally liable.

Official Obligates Corporation

It is certain that until a corporation official is removed from office the corporation is obligated by all contracts made by such officials, authorized directly or indirectly by the corporation's Directors, and relating to the corporation's business. See Rose Company v. Paint Manufacturers, Inc., 18 N. W. (2d) 881, where the president of a corporation made a contract for the corporation. The higher court held the contract valid, because he acted by authority of the Directors.

General Manager's Authority

Considerable discussion has arisen from time to time over the legal question: Is a gas corporation liable on a contract made by its general manager? The answer is: If the power of a general manager is *not* limited, he has *implied* authority to bind the corporation by contracts within the scope of the corporation's business.

For illustration, in Warren v. Littleton, 168 S. E. 226, it was disclosed that a man named Carter, who was general manager of a corporation, made a contract for the purchase of real estate to be used by the corporation.

Later it was contended by the counsel for the corporation that the contract was not valid for the reason that Carter had *no* authority from the Board of Directors to make the contract. However, since it was shown that the Board of Directors had *not* limited the power of Carter to transact business for the corporation, the court held the corporation liable on the contract, and said:

"A general manager, if his authority is not limited, has power to bind the corporation by contracts made in good faith and within the corporation power, without any resolution of the Board of Directors expressly authorizing the contracts. . . . Upon the undisputed evidence we are of opinion that the authorization of the Directors was not essential to the validity of the contract."

Common Employes

Common employes are classified legally as "general" and "special" agents. A "general" agent can make valid contracts, guarantees, and promises within the scope of the department that he manages.

A "special" agent has no broad authority. Under *no* circumstances is a corporation liable for acts or contracts made by a special agent, unless the testimony shows conclusively that the special agent *was authorized* to make the particular contract.

Special agents are bookkeepers, clerks, stenographers, telephone operators, ordinary workmen, and the like. Any of these may make contracts or agreements which obligate the corporation *only* if he has special authority to bind the corporation on each special occasion.

According to a recent higher court one who claims that a special agent has special or additional authority must prove his contentions, or he will lose the suit.

For instance, in State v. Becker, 1 S. W. (2d) 103, it was disclosed that a corporation entered into a contract for delivery of 50,000 fourteen-ounce paper cartons to be embossed and printed in colors. The contract stated that the corporation would supply the carton manufacturer with samples. When the cartons were about ready for delivery an ordinary employe, or special agent, called at the carton manufacturer's factory,

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and inspected the cartons. He *approved* the quality. However, when the cartons were shipped the corporation refused to accept the same on the grounds that they did not equal the samples submitted, and that it was not bound by approval given by its special agent.

The manufacturer instituted suit against the corporation to compel the latter to accept and pay for the shipment, contending that the corporation's agent had *inspected and approved* the cartons before the shipment was made.

The lower court held the corporation bound to pay for the completed order, because the corporation's agent had examined and approved the cartons before the shipment was made. However, the higher court reversed this verdict because the carton manufacturer had *not* conclusively proved that the corporation had *authorized* his special employe or agent to approve the cartons. This court said:

"Certainly, if a principal inspects a thing and pronounce it according to contract before it is packed and delivered, or if he authorize an agent to inspect a thing and also to pronounce whether or not it is according to contract, the principal is bound by his own acts and by those of such agent, because the existence of authority both to inspect and to accept or reject stands admitted. But such is not this case."

Power of Corporation

Considerable discussion has arisen from time to time over the legal question: From where does a gas corporation derive its power, and who has legal authority to bind the corporation?

In Independent, 66 F. Supp. 957, the higher court held that *all* corporations are merely creations of *laws* which authorize their existence, and that no corporation officer or employe may perform any act or make any contract not expressly or impliedly authorized by these laws.

Extra Compensation

As to payments of extra salary and compensation a corporation's official can legally demand and collect for his services, a late and leading higher court decided that either a corporation's charter; by-laws; a resolution of the board of directors; or a resolution by the stockholders is legal authorization for special or additional payments to officials.

In Nashville v. Hopton, 196 S. W. (2d) 1010, the higher court explained that directors and officers of care must perform the *ordinary* duties of their offices without compensation, and ordinarily cannot recover compensation for such services unless payment is authorized by the corporation's charter, or by-laws, or by resolution of the board of directors, or the stockholders themselves.

This court also held that extra compensation may be implied from circumstances. In fact this court held that the corporation must pay the *reasonable* value of managerial services rendered to the corporation by its vice-president and stockholder, although such payment was not authorized by either the corporation's charter, by-laws, or by resolution of either the board of directors or the stockholders. This court held:

"A corporation director or officer may recover reasonable value of services rendered by him to corporation outside his duties and under circumstances fairly indicating that parties intended and understood or reasonably should have intended and understood that such services were to be paid for."

For comparison, see McClayton v. W. B. Cassell Company, 66 F. Supp. 165, where the Federal Court held:

"An officer of a corporation is not in the ordinary sense an 'employe' of the corporation, though he may also be an employe where, in addition to his duties as an officer, he is also employed in a separate capacity."

The Immortal Match....

Here's an instrument that's been around for a long time. No matter how many complicated gadgets are invented to replace it, the match is still an efficient means of starting fires at the lowest possible cost.

In the same way, Iron Sponge has been the leading gas-purification material for over 74 years. Nothing can take its place for the high efficiency and economy it combines.

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The Second Industrial Gas School

THE PURPOSE of the A.G.A. Industrial Gas School to be held in the Hotel Severin, Indianapolis, Indiana, May 9-13, 1949, is to provide intensive technical and sales training for the men who promote or sell gas for the heating operations in industry. New equipment and new techniques in many fields have advanced the progress of gas utilization and created a new opportunity to expand industrial gas sales.

New men need basic training for a successful career in industrial gas sales and experienced men will benefit by this combined refresher and advanced training course.

(Know How + Salesmanship) × Effort = Success.

The five day program will provide instruction in the utilization and sale of industrial gas covering basic principles, heavy industrial applications, air and fluid heating, specialized processes and salesmanship. The lecturers are experienced men with specialized knowledge of the particular subjects they will cover. The School Committee under the chairmanship of John C. Dorsey, The East Ohio Gas Co., Cleveland, is to be congratulated on the calibre of men invited to lecture at the school. Among those from outside the gas industry who will be on the faculty are: Dr. W. L. Sibbitt, Associate Professor of the Heat Transfer Laboratory, Perdue University, Lafayette, Indiana. Dr. Sibbitt is an authority on heat transfer and thermodynamics, and his lecture will have those first principles needed in the approach to heating problems. Raymond R. West, Brown Instrument Division, Minneapolis-Honeywell Regulator Co., Philadelphia, will cover the all important phase of temperature measurement and control. From Battelle Memorial Institute, Columbus, Ohio, S. L. Case will present a most timely subject, "High Speed Heating."

The school sessions have been divided roughly into five main classifications, one to be treated on each day.

Monday—May 9, Basic Principles.

A discussion of the various types of burners and combustion systems used on industrial gas equipment will be lead by H. F. Rehfeldt, The Peoples Gas Light & Coke Company, Chicago. Dr. W. L. Sibbitt will lecture on the basic principles of conduction, convection and radiation; heat losses and methods of heat recovery. Temperature measuring and recording devices and the control equipment used with gas burners will be presented by Raymond R. West. Concluding the first day's lectures on Basic Principles, D. A. Campbell, Bryant Heater Division, Affiliated Gas Equipment, Inc., Cleveland, will present the all important subject of the equipment needed for ignition and combustion protection on gas-fired industrial equipment.

Tuesday—May 10, Heavy Industrial Applications.

The basic elements which enter into the design and construction of heat treating furnaces will be presented by Charles C. Esles, The Ohio Fuel Gas Company, Toledo. Continuing in an allied field, A. M. Thurston, The East Ohio Gas Company, Cleveland, will lecture on "Drying and Finishing Ovens," the principles of good practice and the various types of oven design for this industrial application. On special applications that are a study in themselves, the first on "The Use of Gas in the Pottery Industry" will be given by O. D. Todd, The Columbia Gas System, Inc., Pittsburgh Group, Pittsburgh, Pa., on general pottery manufacturing operations and the use of gas in the ceramic field. Next, H. H. Gieselmann, The Laclede Gas Light Company, St. Louis, Missouri, will discuss vitreous furnaces and the specific problems and product requirements involved in enamel processing operations. Lastly, A. D. Wilcox, Eclipse Fuel Engineering Company, Rockford, Illinois, will speak on "Non-ferrous Metal Melting," describing the various types of furnaces used in the non-ferrous and low temperature metal melting fields. He will include a discussion on crucibles, pots, reverberatory furnaces and furnaces for die and permanent mold casting.

Wednesday — May 11, Air and Fluid Heating.

A leading authority on air heaters, Herman G. Rappolt, J. O. Ross Engineering Corp., New York, will discuss their application and influence on industrial oven design. One subject that is most important to indus-

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trial gas men especially those having contact with plants doing heat treating is that of atmosphere generators and prepared atmospheres. O. E. Cullen, Surface Combustion Corporation, Toledo, Ohio, will lecture on their use in various industrial operations. Following which, W. A. Darrah, Continental Industrial Engineers, Chicago, Ill., will discuss the applications of prepared atmospheres and the results obtained through their use with specific furnaces. Maurice J. Dewey, Dewey Gas Furnace Company, Detroit, will present the basic principles of immersion heaters for water and solution tanks, and new developments for high temperature solutions, metals and salts. Types of gas-designed boilers, ratings and capacities, and the uses of steam for processing together with recommendations for sizing the boiler to the job will be told by P. W. Craig, Equitable Gas Company, Pittsburgh, Pa. As a companion lecture, J. I. Cormany, The Gas Service Company, Kansas City, Missouri, will discuss the practices and trends in converting boilers to gas firing and the problems involved with combustion space, draft, and control equipment.

Thursday — May 12, Specialized Processes.

"High Speed Gas Heating," by S. L. Case of the Battelle Memorial Institute, Columbus, Ohio, will be a discussion of direct flame heating and hardening by gas with comparisons to induction heating for hardening and blanking operations. Textile processing is a field for industrial gas business that has not been developed as fully as it might be. Everett V. K. Schutt, Central Hudson Gas and Electric Co., Newburgh, New York, will give a comprehensive paper on this subject. Another specialized process is glass melting and forming. Rodney G. Hayler, Central Indiana Gas Company, Muncie, Indiana, will describe the application of gas in this field for melting, and forming various glass products, and stress-relieving furnaces. C. H. Lekberg, Northern Indiana Public Service Company, Hammond, Ind., will lecture on the process involved and the application of gas and gas equipment for varnish cooking, paint drying, fume incineration, battery burning, mold drying, ladle heating, etc. Food processing is another field for gas which deserves the interest of gas men. Gas burners and equipment for bread and cracker baking, smokehouses, coffee and nut roasting, and deep fat frying will be presented by Edgar L. Harris, Public Service Electric & Gas Company, West New York, N. J. C. George Segeler, Utilization Engineer, American Gas Association, will again present his interesting talk on the objectives of A.G.A. and the services available to the member companies and individual members. He will also tell the advantages of being a member and participating in association activities.

Friday—May 13, Selling Industrial Gas

An important part of selling industrial gas is to have information on the characteristics of competitive fuels, their composition, advantages and disadvantages, and costs. J. E. Coleman, Pittsburgh Group Companies, Pittsburgh, Pa., will be the lecturer on this subject. "Customer Relations and Selling Tools" with suggestions for securing attention, creating interest, and closing the sale will be presented by Stanton T. Olinger, The Cincinnati Gas & Electric Company, Cincinnati, Ohio. Concluding the sales angle and the week's course, Franklin T. Rainey, The Ohio Fuel Gas Company, Columbus, Ohio, will lecture on the fundamentals of organizing sales efforts and making a successful sales presentation.

The school session will close on Friday afternoon with an examination based on the material presented during the course and at which reference may be made to the printed copies of the lectures.

Enrollment in the Industrial Gas School will be limited to one hundred fifty. Applicants eligible are employees of gas companies, gas equipment manufacturers and industrial gas equipment dealers. To enroll, mail application to M. A. Combs, Secretary, Industrial & Commercial Gas Section, American Gas Association, 420 Lexington Avenue, New York 17, New York. The enrollment fee is $35.00 and check for this amount to the order of A.G.A. should be forwarded with each application. Enrollment will close April 22, 1949.

Applicants should forward their applications at once so that accommodations may be assigned in the Hotel Severin. Hotel rates are $3.75 to $6.00 per person per day, meals not included. Rooms, meals, and other expenses are to be paid by the registrants and are not included in the enrollment fee.

Fuels Conference Slated for Portland, Oregon April 22

A fuels conference covering the present and long range price and supply situation of industrial fuels will be held at the Multnomah Hotel, Portland, Oregon, on April 22, under the sponsorship of the Raw Materials Survey, Inc., and the Oregon Section of the American Institute of Mining and Metallurgical Engineers.

The five fuels available to Northwest industry—coal, wood, electricity, gas and oil—will be discussed by specialists in each field. Stephen Green, Friday Harbor, Washington, an outstanding consultant in the field of coal mining, will cover the coal situation.

An analysis of the use of wood as a fuel will be presented by Dr. Ed. G. Locke, Chief, Division of Forest Utilization, Pacific Northwest Forest & Range Experiment Station, Portland.

Wesley Cook, Rate Supervisor, Portland Gas & Coke Company, will review both manufactured and natural gas.

Electric power, with particular reference to off-peak electricity and energy consumption trends, will be discussed by Ivan Bloch, consulting engineer, Portland.

T. C. Wellman, assistant manager, gasoline and fuel oil division, Standard Oil Company of California, Portland, will cover the subject of fuel oil.

George Gleeson, Dean of the School of Engineering, Oregon State College, will correlate the facts presented regarding each fuel and will summarize the statements made by the panel of fuel specialists.

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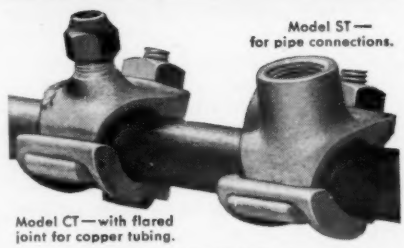

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Annual Business Conference New England Gas Association

WITH a program of unusual interest and scope the Annual Business Conference of New England Gas Association was held at Hotel Statler in Boston on March 24-25.

At the opening session, following the election of officers and directors, and the report of the Executive Secretary, Clark Belden, an address by Nicholas E. Peterson, Vice President of The First National Bank of Boston summarized business trends and the outlook.

E. G. Twohey, president of N.E.G.A. addressed the session and was followed by Robert W. Hendee, president of American Gas Association.

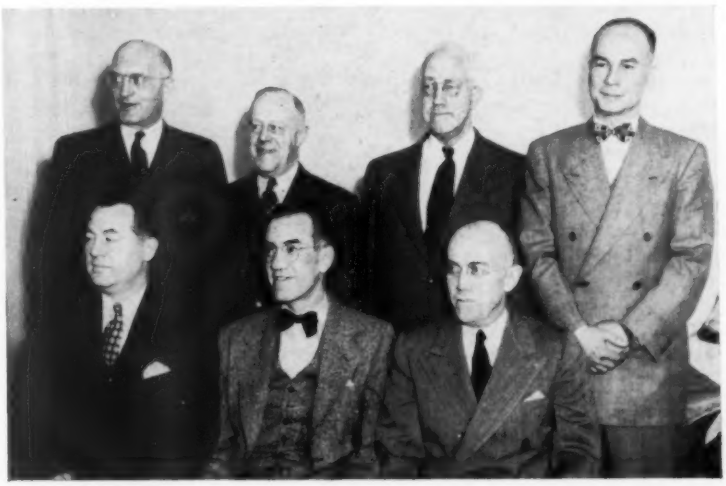
Mr. Hendee spoke on the National Economy with particular reference to the effect of present trends on the gas industry. He said in part:

"Whether you call it "disinflation," recession, readjustment, deflation, or what, it is plain that a reaction to the war and postwar forces of inflation and scarcity has taken place. Signs of changing times are multiplying and even the most learned economists disagree as to what they portend. In recent weeks we have seen price-cutting on a fairly wide scale, commodity market fluctuations, stock market lethargy, relaxed credit restrictions, and other harbingers of changed conditions.

"What is the significance of these signs to the gas industry? While I don't pretend to have an all-seeing crystal ball, it is certain that we are entering an era of unbridled competition for the consumer's dollar. It is also certain that sound and aggressive merchandising, backed by research to improve our product, will enable the gas industry to meet any challenge. . . .

"By all standards, the gas industry stands at the pinnacle of its service to the nation. The utility gas industry serves well over 22 and one half million customers, with an additional four and one-half million getting the benefits of the gas flame from the allied liquefied petroleum gas industry.

"It is significant that a recent staff report of the power and utilities division of the National Security Resources Board forecast a 50 per cent increase in total utility sales of all types of gas by 1952. The board



1949-50 NEW ENGLAND GAS ASSOCIATION OFFICERS

Front Row (l. to r.)—Earl H. Eacker, Incoming President (President, Boston Consolidated Gas Co.); Edward G. Twohey, Retiring President (Vice President, Worcester County Electric Co.); John A. Hiller, 1st Vice President (Sales Manager, Portland Gas Light Co.)

Rear Row (l. to r.)—James A. Cook, Chairman, Nominating Committee (Vice President and General Manager, Lynn Gas & Electric Co.); Otto Price, Treasurer (Vice President, Boston Consolidated Gas Co.); Gordon G. Howie, 2nd Vice President (Vice President and General Manager, Cambridge Gas Light Co.) Clark Belden, Clerk (Executive Secretary)

1949-50 Board of Directors of The New England Gas Association Elected at 22nd Annual Business Conference at Hotel Statler, Boston, March 24, 1949

President—Earl H. Eacker, president, Boston Consolidated Gas Co.; *1st Vice President*—John A. Hiller, sales manager, Portland Gas Light Co.; *2nd Vice President*—Gordon G. Howie, vice president and general manager, Cambridge Gas Light Co.; *Treasurer*—Otto Price, vice president, Boston Consolidated Gas Co.; *Clerk*—Clark Belden, executive secretary, The New England Gas Association.

Elective Directors—Paul R. Buchanan, vice president and general manager, The Hartford Gas Co.; Thomas G. Dignan, president, Malden & Melrose Gas Light Co.; Fred H. Faulstich, assistant manager, Springfield Gas Light Co.; Hall M. Henry, director of gas operations, NEGEA Service Corp., Cambridge; Jesse L. Johnson, vice president, Providence Gas Co.; Sherman Knapp, assistant to the president, The Connecticut Light & Power Co., Hartford; Ronald A. Malony, executive vice president, The Bridgeport Gas Light Co.; A. D. Matarese, vice president and general manager, Brockton Gas Light Co.; H. Coleman Moore, Jr., treasurer and trustee, New England Gas & Electric Association, Cambridge; Herbert A. Murphy, vice president, Stone & Webster Service Corp., Boston; Raymond L. Presbrey, vice president and chief engineer, Boston Consolidated Gas Co.; Charles R. Prichard, Jr., vice president, treasurer and general manager, Gas Service, Inc., Nashua; C. E. Rainsbury, sales engineer, Eastern Appliance Co., Boston; Robert D. Stuart, Jr., general merchandising manager, Blackstone Valley Gas & Electric Co., Pawtucket; William Webster, vice president, New England Electric System, Boston; Alexander McW. Wolfe, manager, American Meter Co., Boston; R. B. Wright, district sales manager, Hardwick Stove Co., Inc., Boston.

pointed out that as long as current price relationships continue 'with gas in many instances the cheapest as well as the fuel most preferred for its inherent qualities, there will be virtually no limit to the total consumer demands for it.'

"While old in experience and service to our country, the gas industry is young in spirit, strong in resources and certain of its destiny. If we but maintain our perspective and pursue the paths on which we are now embarked, we will face an ever widening horizon."

"Natural Gas as Related to New England" was presented by Erick Larson. His address will appear in a later issue of the *Journal*.

Addresses were also presented by Richard S. Meriam on executive responsibilities and relationships and by E. P. Noppel of Ebasco Services Inc., on fuel reserves and trends accompanied by charts.

E. S. Pettyjohn, director of Institute of Gas Technology spoke on Economic Implications of New Production Processes, reviewing with comment recent engineering developments.

Sessions of the second day opened with an address by H. W. Doering of Springfield Gas Light Co. on Selling Air Conditioning in New England.

C. George Segeler, utilization engineer, A.G.A., in his address on Competitive Merchandising Developments, surveyed the cooking and water heating field as applied to New England. His presentation compared the gas and electric rates for these services which greatly favor gas in the matter of cost.

He severely criticized some of the misrepresentations made by electric manufacturers in their advertising and printed literature.

To quote his closing remarks:

"Though not important in New England," he said, "the unvented space heater in bedrooms, prevalent in many parts of the country, is an example of a needed control. New material is available for these purposes and your Association stands ready to offer the assistance that you may desire when considering these matters. All of them, the sales personnel, the sales allies, the quality equipment, the sound installation practices, and an up-to-date building code, are necessary, in my opinion, to place gas and its appliances in the forefront of public acceptance."

J. Edward Drew, associate director of public relations, Lever Bros. Co. spoke on Community Relations, followed by William B. Hewson, assistant to president, Brooklyn Union Gas Company on "Advertising — Spearhead of Promotion."

Mr. Hewson's analysis of the appliance sales and advertising problems which confront us is most constructive and we expect to publish it in the May issue. No brief abstract would do justice to his paper.

"Training for House Service" by Olga P. Brucher, Dean, School of Home Economics, Rhode Island State College, brought out the wide opportunities that await those who have had this special training. We quote in part:

"There are many vacancies for Home Economists in the state extension services as Home Demonstration Agents and as Specialists. Home Economists are employed in almost every type of business that makes or sells products or services used in homes such as food companies, manufacturers of household equipment and textiles particularly companies and the public utilities. Positions in journalism and radio are open to those with suitable preparation. Department stores employ an increasing number of Home Economists in merchandising, in teaching and as consultants. Research, likewise, offers many opportunities for the Home Economist. A college education must, therefore, provide for breadth of training and flexibility."

Frank J. Nugent, President of G.A.W.A. spoke on developments affecting gas appliance manufacturers and Myles M. Mace on Developing Men for Management.

"Labor Developments and the Utilities" was the subject for an extemporaneous address by Dr. Leo Wolman, professor of economics, Columbia University. This address completed the final session.

Southern Gas Association Annual Convention

Biloxi, Miss., has been selected as the site for the forty-first annual convention of the Southern Gas Association to be held April 20, 21, 22, Wister H. Ligon, president of the Association and president of the Nashville (Tenn.) Gas Company has announced.

More than 1000 representatives of the gas industry from 13 Southern states will attend the meet which will have its headquarters at Biloxi's Buena Vista Hotel.

Nationally known authorities, and leaders in the industry will address the group and enter into the many scheduled panel discussions. Extensive study of the latest trends in commercial and consumer use of gas fuel will be emphasized.

R. A. Puryear, Jr., vice president of the Alabama Gas Company, Birmingham, has been appointed general convention chairman, Ligon said. L. L. Peters of the American Stove Company, Atlanta, and J. H. Wimberly, Houston Natural Gas Corporation, will be vice chairman.

Sales sessions chairman is J. M. Lynn, Jr., sales manager for Lone Star Gas Company, Dallas, Texas; operating sessions Jeff H. Collins, Sr., superintendent of the Gas Department at New Orleans Public Service Inc.; accounting sessions J. B. Cookenboo, Houston Natural Gas Corporation. In charge of general sessions will be Mr. Ligon and L. I. Baxter of the Arkansas Western Gas Company, Fayettesville, Ark.

Panels will be presided over by the following: home service, Thelma Holmes, Alabama Gas Company, Montgomery, and Mary Ellen Lauchlin, Oklahoma Natural Gas Company, Tulsa; advertising, Alta Evans, Southern Union Gas Company, Dallas; industrial sales, Ross Walker, United Gas Corporation, New Iberia, Louisiana; residential sales, J. D. Haverkamp, New Orleans Public Service Inc.; accident prevention, W. V. Smith, Oklahoma Natural Gas Company, Tulsa; corrosion, C. L. Morgan, United Gas Corporation, Houston; transmission, Luther Tolbert, Lone Star Gas Company, Dallas.

J. H. Schmidt of the Peerless Manufacturing Company, Dallas, is in charge of entertainment; Maurice White, Mobile Gas Company, housing; J. C. Dezelle, United Gas Corporation, Gulfport, Miss., local arrangements; Mrs. Dezelle, ladies entertainment; publicity, W. J. Amoss, New Orleans Public Service Inc., and attendance, C. B. Wilson, also of New Orleans Public Service.

States represented will include Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

Safety Record for 1948 of The Columbia Gas System, Pittsburgh Group

Nearly 2,600 employes of the seven associated gas companies forming the Pittsburgh Group of The Columbia Gas System, Inc., achieved an excellent safety record in 1948.

According to W. H. Adams, safety director, the average accident frequency rate throughout the five-state area served by Group companies was far superior to other safety records in the United States. The Group average frequency rate was 8.07. This figure represents the number of lost time accidents per million man hours worked.

Mr. Adams indicated that the frequency rate for all industry reporting to the National Safety Council was 13.26. A rate of 22.05 was reported by the gas industry as a whole.

Nearly 260 employes in two distribution districts of The Manufacturers Light and Heat Co. worked a total of 455,818 hours in 1948 without a single lost time accident. More than 100 employes in three gas production and transmission divisions worked a total of 136,456 hours last year with a perfect safety record.

Spring Meeting of Natural Gas Department of A. G. A.

More than 600 reservations had been received late in March by the French Lick Springs Hotel, French Lick, Indiana, indicating that all previous attendance records will be broken at the 1949 Spring Meeting of the Natural Gas Department on May 9 and 10. Approximately 70 ladies are included in the reservations list.

The Program Committee, under Chairman E. F. Schmidt (Lone Star Gas Company, Dallas) has arranged two General Sessions at which timely topics of lasting interest to the industry will be discussed. The General Sessions will be presided over by D. A. Hulcy, Chairmen of the Department and Second Vice President of the A. G. A.

The question of "unification" of the gas industry will be broached by Robert W. Hendee, President of the Colorado Interstate Gas Company, and of the A.G.A. Mr. Hendee has long been interested in furthering unity, coordination and cooperation within the industry and his views on "Doing a Job Together" will be especially pertinent at this time.

Arch M. Booth, General Manager of the U. S. Chamber of Commerce, will discuss the "Business Outlook," outlining the prospects for industry in the years ahead.

"Natural Gas Problems in the Territory of Greatest Reserves" will be discussed by William J. Murray, Jr., Chairman of the Texas Railroad Commission, while "Recent Legal, Regulatory and Legislative Events Affecting the Natural Gas Industry" will be reviewed by Glenn W. Clark, Vice Pres. and General Counsel of the Cities Service Gas Company, of Oklahoma.

The Second General Session will be devoted completely to the complex but vital problem of "Meeting Peak Load Problems." This will include discussions on: "Catalytic Reforming and Thermal Cracking," by Edwin L. Hall, Director of the A. G. A. Testing Laboratories in Cleveland; "Storage of Gas to Meet Peak Loads," including "Economics of Underground Reservoirs," discussed by Max W. Ball, former director of the Oil and Gas Division of the U. S. Department of the Interior; "Pipe Batteries," by F. A. Hough, Vice President of the Southern Gas Company, of California; and "Propane," discussed by A. B. Lauderbaugh, Chief Gas Engineer of the Manufacturers Light and Heat Company, Pittsburgh.

Gas Sales During Fourth Quarter and Summary for 1948

Total revenues from sales of gas by utilities for the fourth quarter of 1948 were $403,000,000, an increase of 13.0 per cent over the like quarter of 1947, the American Gas Association has reported. Revenues from industrial sales represented the highest percentage gain, rising 18.3 per cent. Residential gas revenues were up 10.9 per cent and commercial gas revenues gained 12.6 per cent over a year earlier.

In the twelve month period ending December 31, 1948, total revenues from utility sales of gas were $1,544,000,000, an increase of 11.6 per cent over revenues of $1,384,000,000 in the previous twelve-month period.

The gas utility industry was serving utility gas to 22,300,000 customers at the end of the year, an increase of 3.6 per cent over 1947. Approximately 300,000 customers were served with L-P gas by gas utility companies at the end of 1948. Residential customers totaled 20,700,000, an increase of 3.5 per cent over the 20,000,000 served in the previous year. Commercial and industrial customers gained 4.7 per cent and 3.9 per cent respectively.

Sales of natural gas during the fourth quarter totaled 749,000,000 m.c.f., an increase of 16.1 per cent over the like quarter of 1947. For the year ending December 31, 1948, sales of natural gas amounted to 2,822,000,000 m.c.f., a gain of 12.2 per cent over sales of 2,515,000,000 m.c.f. in 1947. At the end of 1948 about 11,800,000 customers were being served with natural gas, an increase of 10.2 per cent over the previous year.

Manufactured gas sales in the fourth quarter of 1948 totaled 109,000,000 m.c.f., approximately the same as a year earlier. For the full year, manufactured gas sales were 446,000,000 m.c.f., up 2.8 per cent over 434,000,000 m.c.f. sold in 1947. Manufactured gas customers declined slightly in 1948, totaling 8,600,000 at the year-end, down 0.8 under 8,700,000 customers in the previous year.

Mixed gas sales in the fourth quarter of 1948 were 35,000,000 m.c.f., a decline of 11.7 per cent under a year ago, when mixed gas sales totaled about 39,000,000 m.c.f. For the twelve months ending December 31, 1948, mixed gas sales were 147,000,000 m.c.f., a decrease of 14.6 per cent under 172,000,000 m.c.f. sold in the previous year. Mixed gas customers at the end of 1948 numbered 1,900,000 customers, a decrease of 11.3 per cent under the previous year.

The declines in mixed gas sales, revenues and customers were due to change-overs of several large utilities from the distribution of mixed gas to natural gas during 1948.

Gas from Wood Waste

Development of a method of producing domestic gas from wood waste in British Columbia is now being studied jointly by the B. C. Research Council and the B. C. Electric Company, according to the Hon. L. H. Eyres, British Columbia Minister of Trade and Industry. Mr. Eyres said:

Experiments in the gas production project, financed by a $5,000 contribution from the B. C. Electric and an equal amount provided by the Research Council, have resulted in development of a process for producing a gas with a thermal value of over 450 BTU's from waste wood.

"A small pilot unit is now under construction," Mr. Eyres said, "to obtain basic data for the construction of a large scale commercial plant."

Thermal value of 450 BTU per cubic foot is given for the wood-waste gas. On the University campus, Dr. S. E. Maddigan, director of the research council, declined to estimate probable costs of producing domestic gas from wood waste.

Retail price of domestic gas in Vancouver is $1 for the first 300 cubic feet or less, 11 cents per hundred cubic feet for the next 1,700, nine cents a hundred for the next 23,000 feet, and 11 cents a hundred for the excess.

Nuttall Joins Staff of National Bureau of Standards

Dr. Ralph L. Nuttall has been appointed to the staff of the National Bureau of Standards, where he will do research on the thermal conductivity of gases at elevated temperatures and pressures in the Thermodynamics Laboratory.

From 1937 to 1939 he was engaged in analytical research for the Rock Asphalt Company of Utah. He was awarded the du Pont Fellowship in physical chemistry for 1947 and 1948, receiving his Ph.D. in June of last year.

News of the Gas Industry

Fourth Annual Short Course in Gas Technology

An advisory committee for the Fourth Annual Short Course in Gas Technology has been announced by President Ernest H. Poteet of Texas A&I College.

With the Southern Gas Association as sponsor once more, A&I will present the short course May 30 through June 1. C. R. Williams of the Chicago Corp., Corpus Christi, will be chairman of the advisory committee. For the fourth year, Dr. Frank H. Dotterweich, A&I engineering division director, is administrative committee chairman.

Serving with Williams on the advisory committee are John P. Bristow, Tennessee Gas Transmission Co., Houston; John C. Flanagan, United Gas Corp., Houston; A. D. Greene, United Gas Pipe Line Co., Shreveport; Frank S. Kelly Jr., Arkansas Louisiana Gas Co., Shreveport; A. L. Kleberg, King Ranch, Kingsville; John Lynch, La Gloria Corp., Corpus Christi; Chester L. May, Lone Star Gas Co., Dallas;

D. W. Reeves, Oklahoma Natural Gas Co., Tulsa; Frank C. Smith, Houston Natural Gas Corp., Houston; L. O. Vogelsang, Rio Grande Valley Gas Co., Brownsville; C. H. Zachry, Southern Union Gas Co., Dallas; Eli Cunningham, Texas Eastern Transmission Corp., Shreveport; C. I. Wall, West Texas Gas Co., Lubbock; and C. Lee Wood, Houston Pipe Line Co., Houston.

Midwest Personnel Conference Held at Omaha

The A.G.A. Midwest Personnel Conference met for a most successful session at the Fontenelle Hotel in Omaha, March 2, under the Chairmanship of H. H. Duff, Personnel Director of the Panhandle Eastern Pipe Line Co., and the Vice Chairman of the Conference, Roy L. Thomas, Assistant Secretary of the Colorado Interstate Gas Co. The meeting opened with an informative review of the philosophy behind the thinking on Federal Labor legislation headed by D. W. Swarr, Labor Counsellor, Swarr, May, Royce, Smith & Story, attorneys, Omaha. R. L. Matheson, Safety Engineer of the Panhandle Eastern Pipe Line Co., described the comprehensive accident prevention program of his company as a beginning to other proposed activity of the Conference in this field. A number of safety men attended and held a separate meeting in the afternoon. Kurwin R. Boyes, Secretary of the American Gas Association, presented impressions of personnel developments in industry in general with particular emphasis on those in the gas industry.

As customary the remainder of the meeting was devoted to the reporting and discussion of company developments. The arrangements for the meeting were made by J. T. Innis, General Supt., Northern Natural Gas Co. and Secretary of the A.G.A. Midwest Personnel Conference.

CONVENTION CALENDAR

April

4–6 *Distribution, Motor Vehicle & Corrosion Conference,* Netherlands Plaza Hotel, Cincinnati.

5–7 *AGA Sales Conference on Industrial & Commercial Gas,* Andrew Jackson Hotel, Nashville, Tenn.

5–7 *G.A.M.A. Annual Meeting,* Broadmoor Hotel, Colorado Springs, Col.

10–12 *Gas Meters Assn. of Florida-Georgia Annual Meeting,* Ponce de Leon Hotel, St. Augustine, Florida.

11–13 *AGA-EEI Spring Accounting Conference,* Hotel Book-Cadillac, Detroit, Mich.

11–13 *Mid-West Gas Assn. Annual Convention,* Hotel Fort Des Moines, Des Moines, Iowa.

11–13 *National Association of Corrosion Engineers,* Netherlands-Plaza, Cincinnati, Ohio.

11–15 *Western Metal Congress and Exposition,* Shrine Convention Hall, Los Angeles.

12–14 *Southwestern Gas Measurement Short Course,* College of Eng'g., University of Oklahoma, Norman, Okla.

18–20 *Midwest Power Conference,* Hotel Sherman, Chicago, Ill.

20–22 *Southern Gas Assn. Annual Convention,* Buena Vista Hotel, Biloxi, Miss.

28–29 *Indiana Gas Assn.* French Lick Springs Hotel, French Lick, Ind.

May

9–10 *A.G.A. Natural Gas Dept. Spring Meeting,* French Lick Springs, Indiana.

9–11 *Liquefied Petroleum Gas Assn.* Annual Convention and Trade Show, Palmer House, Chicago.

9–13 *AGA Industrial Gas School,* Hotel Severin, Indianapolis, Ind.

17–19 *Pennsylvania Gas Assn.* Annual Convention, Galen Hall, Wernersville, Pa.

20 *New Jersey Utilities Assn.* Spring Meeting, Seaview Country Club, Absecon, N. J.

23–25 *AGA Production & Chemical Conference,* Hotel New Yorker, New York, N. Y.

24–27 *National Restaurant Exposition,* Atlantic City, N. J.

26–27 *The Natural Gas & Petroleum Assn. of Canada Annual Meeting,* Hotel London, London, Ont.

30 to June 1 *Fourth Annual Short Course in Gas Technology,* Kingsville, Texas.

June

16–20 *Canadian Gas Assn.* Annual Convention, Bigwin Inn, Lake of Bays, Ontario.

20–21 *New York-New Jersey Regional Gas Sales Conference,* Essex & Sussex Hotel, Spring Lake, New Jersey.

24–25 *Michigan Gas Assn.* Annual Convention, Grand Hotel, Mackinac Island, Mich.

September

19–21 *National Butane - Propane Assn.,* St. Louis, Mo.

October

11–14 *American Standards Assn.* Annual Meeting, Waldorf-Astoria, New York.

17–20 *American Gas Assn.,* Annual Convention, Chicago, Ill.

Southwest Personnel Conference Held in Memphis

Under the auspices of the A.G.A. Southwest Personnel Conference some 40 personnel executives of gas companies in the area held a most successful meeting on February 28 in the Hotel Peabody, Memphis, Tenn. The Chairman of the Conference, V. H. Luneborg, Personnel Manager of the Arkansas Natural Gas Corporation, presided. A paper presented by Kurwin R. Boyes, Secretary of the American Gas Association offered pertinent observations on human relations in industry and included a plea for increased attention to supervisory training.

M. V. Cousins, Director of Personnel, United Gas Pipe Line Co., offered an interesting report on his attendance at the Advance Management Program, a thirteen weeks course conducted by the Harvard Graduate School of Business Administration. Mr. Luneborg described the second annual survey of fringe benefit costs to be made by the national personnel Committee. A discussion on specific problems facing companies including such subjects as basis for rental and allotment of company houses, contract negotiations and cost of living bonuses followed.

A questionnaire on personnel policies to be sent to the companies represented in the Conference was submitted by Harold F. Taylor of the Oklahoma Natural Gas Company and a number of changes were agreed upon.

On the recommendation of a Committee, the Conference by formal vote became affiliated with the Southern Gas Association.

Committee on Displays at National Expositions, Meeting, A.G.A. Headquarters, December 29, 1948. Left to right around table: Al Hess, Detroit-Michigan Stove Co., New York; Frank Drohan, American Stove Co., New York; C. A. Young, J. C. Pitman & Sons Inc., New York; M. A. Combs, A.G.A., New York; W. D. Relyea, Public Service Electric & Gas Co., Newark, N. J.; Hugh Wathen, Chairman, South Jersey Gas Co., Atlantic City, N. J.; Frank Doyle, J. C. Pitman & Sons Inc., New York; L. H. Barry, Display House, Philadelphia; John J. Bourke, A.G.A., New York; C. C. Hanthorn, Philadelphia Gas Works Co., Philadelphia; Chester A. Shear, Standard Gas Equipment Corp., New York.

Personnel Conference of A.G.A. Held March 11th at Chicago

The American Gas Association Great Lakes Personnel Conference held a most successful session on March 11, at the Palmer House, Chicago, Ill. A featured speaker at the meeting was Dr. Raleigh Stone who delivered a stimulating talk on the expansion of employee benefit plans. In light of developments he reviewed objectively. Dr. Stone expressed the belief that any expansion of such plans should be on a contributing basis.

L. A. Brandt, Director of Employee Relations, The Peoples Gas Light & Coke Company, presided at the Conference. New officers were elected as follows: Eugene L. Ramsey, Assistant Vice President. The Laclede Gas Light Co., Chairman; Tom Hayes, Director of Personnel and Public Relations, Milwaukee Gas Light Co., Vice Chairman and E. W. Christell, Training Supervisor, The Peoples Gas Light & Coke Co., Secretary. The nominations were made by a Committee consisting of Fred R. Rauch of the Cincinnati Gas & Electric Co.; Clifford B. Boulet of the Wisconsin Public Service Co., and David R. Edwards, Columbia Engineering Corp.

As customary in these regional personal conferences, considerable time was spent in reporting and discussing company personnel developments. The group unanimously voted to join with the other two regional personnel conferences and the Personnel Committee of the A. G. A. in sponsoring the fourth annual National Personnel Conference of the gas industry next November at a place to be announced. It was agreed the next meeting of the A. G. A. Great Lakes Personnel Conference would be held in Chicago next June on a date to be announced by the Secretary.

LPGA Utilities Section to Meet

Chairman Ralph L. Sieben of the Utilities Section of the Liquefied Petroleum Gas Association has announced that the Utilities Section of that Association will hold its first meeting during the 1949 LPGA Convention and Trade Show at the Palmer House in Chicago, Illinois on May 9-11, 1949. The Utilities Section meeting is scheduled for May 10th as part of the Convention program.

Appearing on the Section program, in addition to a business meeting, will be Mr. Frank Knoy, Mr. H. Emerson Thomas and Mr. Sieben. Mr. Knoy will present a paper on "Problems Encountered in Interchanging Gases." He is widely known as the author of the Knoy Interchangeability Formula and for undertaking the first experimental work in mixing propane with natural gas. Formerly with the Institute of Gas Technology, Mr. Knoy is now Gas Research Engineer for Eastern Gas and Fuel Associates, Boston, Massachusetts.

Mr. Thomas of Westfield, New Jersey, Vice President, Pennsylvania and Southern Gas Company, will give the section a talk on "Unaccounted For and Leakage Problems and Methods of Correction of Same." Mr. Sieben, President of Metrogas, Inc. and General Manager, United Cities Utilities Company, both of Chicago, Illinois, will speak on "Flexible Rate Structures to Meet Changes in Fuel Costs."

Gas Exhibit at the Restaurant Show

The Auditorium in Atlantic City will be the scene of the 1949 National Restaurant Exposition, May 24-27, where the American Gas Association will again sponsor a Combined Commercial Cooking Exhibit which will be the largest single exhibit in this important trade show.

Facing the boardwalk entrance on the main floor of the exhibition hall with three main aisles running through the gas area, the cooperating exhibitors will have a preferred location for their latest models of heavy duty gas cooking equipment.

The Restaurant Show affords an opportunity for commercial gas men to meet with manufacturers and restaurant operators and to see at first hand the new appliances and what is being done to promote more efficient kitchen operations in the volume cooking field.

The Industrial and Commercial Gas Section's Committee on Displays at National Expositions met recently to assign space to the cooperating exhibitors. Those companies who will be in the A. G. A. space are: American Stove Company, Anetsberger Brothers, Inc., The G. S. Blodgett Co. Inc., The Cleveland Range Co., Detroit-Michigan Stove Co., Duke Mfg. Co., Groen Mfg. Co., B. H. Hubbert & Son, Inc., Lyons-Alpha Products Co. Inc., Market Forge Co., National Cornice Works, J. C. Pitman & Sons Sales Corp., Sellers Engineering Co., Robertshaw-Fulton Controls Co., Savory Equipment Inc., A. O. Smith Corp., Standard Gas Equipment Corp.

John J. Dowling Elected V. P. Connecticut Power Co.

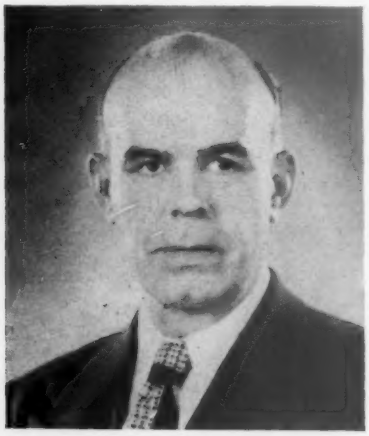
John J. Dowling, Manager of the New London Division of The Connecticut Power Company has been elected Vice President in charge of engineering and operation of its gas facilities.

Mr. Dowling is a native of Providence and is a graduate of Rhode Island State College where he received a degree in Chemical Engineering in 1919.

He has acted as consulting gas engineer for the Company for several years.

Southern California Gas Co. Appoints Ogborn to New Post

The appointment of R. F. Ogborn, formerly assistant Los Angeles district manager, to the post of manager of customers' department of Southern California Gas Company, was announced, effective March 1. Mr. Ogborn took over the position vacated by the sudden death in February of H. W. Davidson.



R. F. Ogborn

Mr. Ogborn joined Southern California Gas Co. in March, 1926, at the Burbank, Calif., office, being transferred to Glendale later that year. In 1935 he was transferred from the position of chief clerk at Glendale to Los Angeles as office engineer. He was appointed district agent at Bakersfield in July, 1936, holding that position till February, 1939, when he was moved to Pasadena as assistant district manager. In 1942 Mr. Ogborn was appointed assistant manager of the Los Angeles District, a position he held until his succession to Davidson.

Samuel Unitt, formerly supervisor of orders, has been assigned the position vacated by Ogborn.

Trembly Appointed Sales Mgr. Philadelphia Gas Works

Frank H. Trembly, Jr., has been appointed Sales Manager of The Philadelphia Gas Works Company, it was announced recently by Hudson W. Read, President of the utility.

Trembly, who served as the gas company's assistant sales manager for the last 15 years, succeeds H. S. Christman, who died suddenly on February 17th.

A graduate in chemical engineering of Carnegie Institute of Technology, Trembly has been associated with the gas industry for 25 years. He is active on many committees of the American Gas Association, and is a past president of the Pennsylvania Gas Association.

He lives near Doylestown, Pa. He was employed by the Surface Combustion Corporation in engineering and sales work from 1924 to 1931, when he came to The Philadelphia Gas Works Company, as supervisor of the Industrial Division.

In 1934, Trembly was appointed Assistant Sales Manager of the gas company. He was chairman of the Industrial and Commercial gas section of the American Gas Association during 1938-39.

Heating Men Visit Los Angeles Laboratories

The Pacific Coast Branch of the American Gas Association Testing Laboratories recently was host to over 100 members and guests of the Institute of Gas Heating Industries of Los Angeles.

The guests were shown through the Laboratories by members of the staff. Groups were guided by W. H. Vogan, Supervisor; Frank Fiedler Jr., Assistant Supervisor; M. A. Dudden, Chief Test Engineer; Pieter Root, Jr., Assistant Chief Test Engineer; and James A. Stone, Chief Inspection Engineer.

The Institute is an organization of manufacturers, installers, dealers and jobbers, formed for the purpose of promoting high standards of installation for heating equipment in the Los Angeles area. It also promotes good relations with consumers. Ernest Kimmell is Managing Director.

Borden Appointed Director of Publicity for L.P.G.A.

Appointment of Robert E. Borden as director of publicity and advertising for the Liquefied Petroleum Gas Association was announced in March by Howard D. White, Executive Vice President.

Borden, for many years publicity director of Commonwealth Edison Company, also served in various advertising and editorial capacities with the Chicago utility.

Borden was president of the Publicity Club of Chicago in 1945-46 and president of the Industrial Editors Association of Chicago in 1934.

Liquefied Petroleum Gas Association is the national trade organization of the butane and propane gas industry. Included in its membership are oil company producers and distributors of the gases and manufacturers and distributors of liquefied petroleum gas equipment and appliances. Executive offices are at 11 S. LaSalle Street, Chicago.

Southern Counties Gas Co. Announces Appointments

Floyd S. Parmenter was named by Southern Counties Gas Co. of Los Angeles in March to fill the newly created position of manager of sales, it has been announced by Vice-President Norman R. McKee.

Parmenter's new post gives him direction over all appliance sales and collateral activities of the sales department.

Clyde H. Potter, formerly appliance sales manager, has been assigned to public relations work under Vice-President McKee, with the title of special assistant.

Parmenter was employed by Southern Counties Gas Co. in 1934 as a salesman in the Monrovia District. He was transferred to the company's Eastern Division in December, 1941, as sales supervisor, a post he held until 1945, when he was appointed assistant manager of appliance sales.

Lancaster Gas Company

A new subsidiary of United Gas Improvement Co., Lancaster County Gas Company, was incorporated January 20, 1949, U.G.I. acquiring all of its common stock amounting to $2,500,000. The Lancaster Company commenced operations March 1, 1949, having acquired all of the property and franchises of Pennsylvania Power & Light Company relating to the manufacture and distribution of gas in Lancaster County, Pennsylvania. The Harrisburg Gas Company acquired similar facilities in the Carlisle area of Cumberland County, Pennsylvania.

The Company's subsidiaries are pioneering in the utilization of catalytic cracking plants for peak load use, plants installed by The Harrisburg Gas Company and Consumers Gas Company (Reading) now being in operation, and the plant of Allentown-Bethlehem Gas Company is in process of construction.

Increased House Heating Service Now Available

Definite proof that The Manufacturers Light and Heat Co. has made tremendous strides in conquering the "gas shortage" problem was seen when the company and its associated companies announced approval had been given to more than 6,500 applications for permits to install gas-fired units in residences scattered throughout Pennsylvania, Ohio and Maryland.

The approvals granted early in March have cleaned up nearly all pending applications received to March 1.

The gas company is continuing to receive applications for gas house heating. Approval on applications received after March 1 must await a continued improvement in gas supply, it was announced.

"Generally mild winter weather," a gas company spokesman pointed out, "is largely responsible for our being able to grant these thousands of requests. Then too, we have been able to complete many construction projects which were undertaken so we could maintain better gas pressures in winter weather."

International Gas Conference to be Held in London in June

The Fourth International Gas Conference sponsored by the International Gas Union will be held in London, June 15th to 17th. The International Gas Union is comprised of national Gas Associations throughout the world, with headquarters at London and Zurich. International activities, which were interrupted during the war, were resumed in 1946.

At the London meeting next year reports prepared by national Associations and papers submitted by individual members will be presented. Papers and discussions will cover all phases of gas making, including manufacture, distribution, utilization, research and statistics.

Participants at the Conference also are invited to attend the 86th Annual Meeting of The Institution of Gas Engineers which will be held in London on June 13th and 14th, 1949.

Range Sales Promotion for Appliance Dealers

Carrying its $4,000,000 domestic gas range advertising and promotional campaign through to the dealer level, the American Gas Association has completed a dealer campaign to stimulate sales of all types of domestic gas ranges. Sales and promotion executives of all gas utility companies will receive copies of a 16 page, 2 color portfolio for distribution to more than 12,000 gas appliance dealers.

Designed to promote planned salesmanship on a fair profit basis as an attractive off-set to the trend toward price cutting and discount selling that has been initiated in some areas, the dealer portfolio offers a concise and complete collection of suggestions and ideas for effecting profitable sales of domestic gas ranges. The portfolio will augment the gas industry's coordinated national advertising campaign which will bring more than 1¼ billion sales messages on modern, domestic gas ranges to American housewives in 1949.

Today's market potentialities for sales of gas ranges are tremendous. Survey shows that 3 out of every 4 gas ranges in use today are more than 5 years old; 1 out of every 2 is more than 10 years old; while 1 out of every 4 ranges is over 15 years old. An excellent replacement market for gas range dealers awaits planned sales efforts. It is estimated that 1 new dwelling unit will be built this year for each 40 units now existing. The portfolio points out methods for securing a proportionate share of this new appliance market.

Suggestions for floor and window displays with live or talking ranges are presented in the new portfolio. Programs for building prospect lists are outlined; door-openers for house-to-house selling are offered; complete themes for newspaper and magazine advertising campaigns are included. Indisputable facts concerning profit building and an array of selling points in the portfolio offer a convincing argument against price cutting as a method for stimulating sales.

Early responses from gas utility companies hold proof of the gas industry's confidence that last year's record of sales of 2,800,000 domestic gas ranges can be broken in 1949. All sights are being set on this target.

Approval for LP Heater

A. G. A. approval for operation of the South Wind Model 988 space heater with LP gases has been received by the South Wind division of Stewart-Warner Corporation.

The heater given A. G. A. approval when equipped with special LP gas burner has an input rating of 31,000 B.T.U./hr. Equipped with a modulating thermostat, it employs spark ignition and has both a bi-metal switch and a fusible link fuel shut-off safety switch. It is 11 x 14 x 32 inches in size, when encased in its cabinet and weighs approximately 45 pounds less cabinet. It operates on 110V,-60 cycle A.C.

Rockwell Appoints Caouette New General Manager

Ralph G. Caouette has been appointed General Manager of the Pittsburgh Equitable Meter Division of Rockwell Manufacturing Company. The announcement was made by L. A. Dixon, Vice President in charge of meter and valve divisions.

R. G. Caouette

Mr. Caouette has had a wide and varied experience with Rockwell, having been Production Superintendent of the Delta Division before coming to Pittsburgh. Later he became Manager of Industrial Engineering for all of Rockwell Manufacturing Company's plants.

He has recently been Gneral Manager of the Red Star Products Division at Norwalk, Ohio.

Before joining Rockwell, Mr. Caouette was Industrial Engineer for Minneapolis-Moline Implement Company at Moline, Illinois.

Gordon Hentz, Gen. Sales Mgr. Estate Stove Company

Appointment of Gordon Hentz as General Sales Manager is announced by Cecil M. Dunn, who was recently advanced to the position of General Manager of The Estate Stove Company, Hamilton, Ohio.

Gordon Hentz

Mr. Hentz has previously been acting as Division Manager over the consolidated New England and New York Divisions, with headquarters in New York. Prior to this advancement he had been Division Manager in New England for a year and a half.

Before becoming associated with Estate, Mr. Hentz was New England Commercial Manager for Toastmaster Division, McGraw Electric Company. Prior to the war, he worked for ten years in the Merchandising Division of the Niagara Hudson Power Company.

"It's Welding Time"—Bulletin of Lincoln Electric Co.

To present interesting case histories and ideas on how to use arc welding most effectively in cutting factory operating costs and production costs, The Lincoln Electric Co., Cleveland 1, O., is publishing an 8-page rotogravure news sheet. "It's Welding Time" is issued regularly and is sent free to factory personnel interested in cutting the costs for which they are responsible.

Edited and prepared not to present detailed explanations of how to do specific jobs, but rather to be a thought starter for the cost conscious plant superintendent, plant engineer, master mechanic, methods engineer and maintenance engineer. The current issue contains over 50 photographs and drawings showing how plants in all parts of the country are using arc welding.

"It's Welding Time" is sent free of charge to those interested by writing to The Lincoln Electric Co., Cleveland 1, O., on your letterhead.

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AMERICAN METER COMPANY HOLDS ANNUAL SALES MEETING

The Annual National Sales Meeting of American Meter Company and subsidiaries was held in the Stevens Hotel, Chicago, February 1st to 3rd, 1949.

The advantages of American Meter Company products, recent developments, the results of project and research programs, as well as effective engineering and customer service assistance, were thoroughly analyzed and discussed.

The following personnel attended from American Meter Company: William B. Ashby, Philadelphia; Arthur F. Benson, Erie; Charles Bolliners, New York; Henry F. Cain, Boston; Alexander S. Chatfield, Philadelphia; Alexander B. Cloud, New York; Carl H. Collins, Kansas City; James J. Cooney, Albany; Roberts F. Conners, Boston; Donald R. Cousland, Chicago; Earl B. Cutter, Kansas City; C. B. Dushane, Jr., Chicago; John Gribbel, II, Philadelphia; William S. Guitteau, Fort Lauderdale; William G. Hamilton, Jr., Philadelphia; Daniel J. Harty, Pittsburgh; Murray S. Hitchcock, Atlanta; Merritt V. Howard, Philadelphia; Robert A. Hunter, Jackson, Miss.; Norton McKean, Albany; Raymond Menkemeller, Minneapolis; Charles Mitchell, Boston; Robert D. O'Neil, Birmingham; Calvin N. Payne, Jr., Denver; James T. Pruet, Chicago; William B. Smith, Huntington; George W. Stevenson, Los Angeles; Donald H. Thompson, Chicago; Kenneth C. Tomlinson, San Francisco; Bertram S. Truett, San Francisco; John Van Norden, New York; Wallace T. White, Richmond; Louis M. Wise, Chicago; Raymond B. Wilmarth, Chicago; A. McW. Wolfe, Boston.

Present from Westcott & Greis, Inc.: Clay G. Braswell, James M. Browning, Cade Clover, Anthony Costa, Louis V. Hickman, J. W. Johnston, C. J. Kribe, B. W. McKalip, J. H. Satterwhite, Harold W. Wahl, S. Calvin Walker.

Present from Reliance Regulator Division: J. J. Delaney, James Gesner.

Present from Canadian Meter Company, Ltd.: Sydney Green, John W. Ostler.

Glenwood Range Co. Announces Plans for the Addition of New Products

The Glenwood Range Company, seventy-year-old Massachusetts stove company, has announced plans for the decentralization of production and the future addition of new products bearing the Glenwood name.

In making the announcement William L. Cooper, president of Glenwood, said: "The Glenwood name has been actively publicized and advertised for more than half a century and has outstanding consumer acceptance.

"It has been the plan of the Glenwood management, for some time now, to increase the number of products under the Glenwood name. We believe that this will give our authorized dealers an opportunity to profit to a considerably greater extent, from the Glenwood franchise which they now hold.

"Since the war, Glenwood management has invested more than a million dollars in our Taunton plant. Recent plans called for the further investment of a similar sum over the next year for the purpose of future plant modernization.

"However, our search for new products and additional manufacturing facilities during the past six months revealed superior manufacturing plants in various localities. These ultra modern facilities are available not only for manufacture of allied Glenwood products, but for the production of fine ranges as well.

"After June 1st, the most popular models in the Glenwood line will continue on a decentralized basis. Only the most modern facilities will be used and all manufacturing will be done to rigid Glenwood standards and under constant supervision by experienced Glenwood personnel.

"The addition of new, allied products under the Glenwood name," according to Mr. Cooper, "will give our dealers an opportunity to capitalize on their loyalty and support, and on the advertising and promotion that they, as well as we, have put into Glenwood over many years. This program of enlarging the number of Glenwood products is one of mutual advantage for our dealers and ourselves."

Glenwood advertising, merchandising and sales personnel with the exception of future additions, will remain unchanged, the statement continued.

Gas Flame Made Feature in Magazine Advertising

The Spring campaigns in the March issues of popular magazines used by Cribben & Sexton Company, tell the story of "the flame," rather than giving details of its new gas ranges.

The copy calls attention to the fact that "Gas has captured the hot flame of glowing coals, separated it from its hotbed and applied it, clean and modern, to cooking."

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No doubt you are interested in highest quality Meter Repairing. Our policy is one of honest work performed by experts, our service is prompt, materials of the best.

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Keystone Driller Co. Expands Construction Equipment Line

Keystone Driller Company, Beaver Falls, Pa., has formed a new department to enlarge their scope of activity in the industrial and construction machinery field.

The Equipment Division, with offices in downtown Pittsburgh at 419 Wood Street will facilitate convenient and rapid customer service.

Robert H. Fox

Robert H. Fox and Associates of Van Nuys, California now direct the engineering and marketing of industrial equipment. Mr. Fox, formerly with Six Wheels, Inc. of Los Angeles, California, has pioneered the application of rubber tires to heavy construction machinery since 1922 and brings to Keystone the asset of his years of experience in this field.

Keystone has contracted for the exclusive manufacturing rights to all designs and products of the Fox organization including a 15 to 25 ton capacity self propelled one man crane carriage or wagon on pneumatic tires for all makes of cranes.

The self-propelled, rubber tired mounted cranes, are able to travel over rough terrain with their capacity loads which gives them many advantages over the locomotive type of truck mounted crane.

The factory located at Beaver Falls, Pa., is in a strategic location for rapid delivery of finished products and the procurement of material supply and labor.

Dowell Inc. of Tulsa Takes Over Pipe Protection Sales

Sale of cathodic protection products for retarding electrolytic corrosion of pipelines and industrial equipment has been transfrred from the Magnesium Sales Diviison of The Dow Chemical Company to Dowell Incorporated, a wholly-owned Dow subsidiary, according to an announcement by the parent company.

The Dowell organization has headquarters in Tulsa, Okla., and maintains some 45 offices and field stations throughout most of the oil producing and industrial areas of the country.

Guy Williams, assistant sales manager and a member of the Dowell staff for 12 years, heads up the new sales activity while Yale Titterington, a Dow corrosion and development engineer for seven years and previously corrosion engineer for the Northern Natural Gas Co., will handle technical service aspects.

Only one type of magnesium anode, a cored rod for use in domestic hot water heaters, is retained by the Dow Magnesium Sales Division.

Corrosion Control for Underground Pipe

A new 28-page manual describes methods employed to protect underground pipe lines from corrosion and the role of Fiberglas pipe wrap in corrosion control. Test data on the properties and performance of Fiberglas pipe wrap are included. The manual is illustrated with charts and photographs. Copies may be obtained from Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.

Detroit-Michigan Stove Co. Appoints DeBee Dist. Mgr.

Appointment of B. M. DeBee as District Manager, Eastern Division of Detroit-Michigan Stove Company is announced by John C. Pankow, Director of Sales. Mr. DeBee will work under C. M. Jewell, Eastern Divisional Sales Manager.

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A utility machine with merit, power, speed and economy. Increases output of your compressor. Cuts concrete and tamps backfill at a rapid pace. Cuts cost to a minimum. Entirely air powered. Cuts concrete the easy way!

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Metropolitan Utilities of Omaha Promotes M. K. Wrench

M. K. Wrench, former Superintendent of Production for The Metropolitan Utilities District of Omaha, has been appointed by The Utilities Board of Directors to the position of Manager of the Department of Gas Operation.

He started his gas education as a meter reader and clerk for The Greenville Michigan Gas Company. Later he joined the Central Public Service Corporation, Chicago, and worked in subsidiaries in Michigan Federated Utilities, Southern Cities Public Service and Central Natural Gas Corporation.

Mervyn K. Wrench

In 1931 he joined the Minneapolis Gas Light Company as Water Gas foreman and when he left there in 1937 was Assistant Plant Superintendent.

In 1937 he moved on to Savannah Gas Company, Savannah, Georgia, as a General Superintendent, remaining in this position until the latter part of 1939, when he joined the Metropolitan Utilities District of Omaha as Superintendent of Production.

When Mr. Wrench joined the Metropolitan Utilities District they were making Blue Water Gas and enriching with Natural Gas, to send out a mixed gas of 550 B.T.U. The Utilities are now using Natural Gas.

He belongs to a gas family, his brother, Harry K. Wrench being President and General Manager of The Minneapolis Gas Company, and his nephew, Harry K. Wrench Jr., President of Wisconsin Fuel and Light Co., Manitowoc.

Schaible Company Acquires Williams Valve Company

The Schaible Company of Cincinnati has recently acquired the D. T. Williams Valve Company, also of that city, manufacturers of standard pressure and high pressure valves.

The Williams Valve division production includes bronze and iron stop valves, check valves, gate valves, steam cocks, gauge cocks, water gauges and numerous specialties used in oil and gas operations, construction and other industrial purposes.

Prevention of Closure of Oven Burner Ports

Research Bulletin 54, a new publication of the American Gas Association Laboratories, entitled "Investigation of Causes and Prevention of Closure of Oven Burner Ports," is a report with supporting data on Domestic Gas Research Project DGR-8-B, a PAR Plan activity.

Experimental studies were conducted with manufactured gas at burner temperatures from 725 F to 1,500 F. The extent of port closure which occurs with elapsed burner operating time and with increased temperatures was determined.

Included in the information secured were possible means of reducing oven burner port closure. These are to treat the burner surface with a suitable protective coating such as aluminum, for which data are presented, or to alter the cast iron composition by the use of alloying elements.

This bulletin represents the fifteenth published report of the A.G.A. Laboratories dealing with gas burner design research. Copies available through A.G.A. Headquarters or Laboratories at $1 each.

Gas Heating Equipment in Confined Spaces

Research Bulletin 53, a new publication of the American Gas Association Laboratories, entitled, "Effects of Confined Space Installation on Central Gas Space Heating Equipment Performance," is a report with supporting data on Domestic Gas Research Project DGR-6-CH, a PAR Plan activity.

The increasingly common practice of installing furnaces and boilers in closets or similar confining spaces has created new problems in assuring safe and satisfactory installation of central gas space heating equipment. These considerations include (1) provision of an adequate supply of combustion air; (2) prevention of circulation of combustion products with heated air to the living quarters in the event of spillage from the draft hood; (3) provision of adequate ventilation of the enclosure and of adequate space around the furnace or boiler to avoid excessive wall or ceiling temperatures; (4) avoidance of space sufficiently large to encourage storage of household equipment which might interfere with combustion and ventilation air supply.

Experimental studies were conducted with various numbers, areas, and locations of openings in the enclosure. Optimum values of each of these factors were determined for the purpose of assuring safe operation and satisfactory performance of appliances so installed.

Included in the report are recommendations on spacing of enclosure walls from the furnace casing and draft hood shield, and on such other factors as return air duct connections, flue connections, clearance at front of furnace enclosure, etc., which pertain to good installation practices.

This bulletin represents the fourth published report of the A.G.A. Laboratories on central gas space heating research. The research work was conducted under the sponsorship of the Committee on Domestic Gas Research, R. J. Rutherford, Chairman.

It is a 52-page publication, copies available through A.G.A. Headquarters or the Laboratories at $1.75.

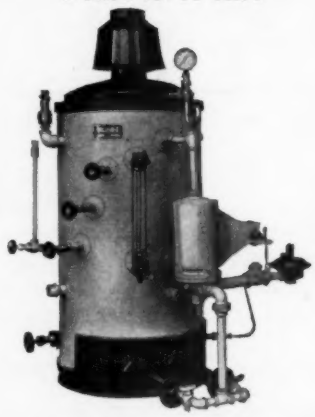
Roberts Brass Mfg. Co. Appoints Sales Mgr.

Roberts Brass Manufacturing Co. of Detroit announces the appointment of Mr. Frank E. Hangosky as Sales Manager.

Mr. Hangosky succeeds Mr. F. W. Schmidt who will now be able to devote more of his time to his duties as Secretary.

LATTNER GAS BOILERS

1 H.P. to 45 H.P.



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Safety Gas Main Stopper Co.

523 Atlantic Avenue, Brooklyn, New York

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Service and Personnel Superintendent—To make headquarters in New York for national organization and spend half time traveling on supervisory work. Must be under 40 and have good gas appliance service experience. State present salary, starting pay expected, education and former employment. Box No. 200 c/o American Gas Journal 53 Park Place, New York 7, N. Y.

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Pacific Chemical Exposition

Mr. James O. Clayton, research associate of the California Research Corporation, is chairman of the Pacific Chemical Exposition, scheduled for November 1-5, 1949, at the San Francisco Civic Auditorium, according to Dr. Richard Wistar, chairman of the California Section of the American Chemical Society.

Dr. Wistar has appointed to the Exposition committee to assist Mr. Clayton: Donald W. Baldra, Schering Corporation; Lloyd F. Brooke and Dorr H. Etzler, California Research Corporation; Leo R. Gardner, California Spray Chemical Corporation; Hans Lineweaver, Western Regional Research Laboratory; Miss Valerie Phillips, San Francisco College for Women; L. W. Van Doren, Oronite Chemical Company; and Worden Waring, Shell Development Company.

Mr. Marcus W. Hinson is manager of the Exposition, with offices in the Whitcomb Hotel, San Francisco 1, California.

New Jersey Utilities Assn.

A one-day Annual Spring Meeting of New Jersey Utilities Association will be held at the Seaview Country Club, Absecon, N. J., on May 20th.

Detroit-Michigan Stove Co. Appoints Division Mgrs.

V. L. Berger and C. C. Redding have been appointed District Managers, Southwestern Division, by Detroit-Michigan Stove Company and will work under the direction of John M. Storm, Jr., who has been appointed Southwestern Divisional Sales Manager.

E. R. Tillotson has been appointed District Manager, Southeastern Division, and will work under the direction of F. F. Hamilton, Southeastern Divisional Sales Manager.

Ward Jacobson has been appointed District Manager, Central Division, and will work under the direction of Paul Inskeep, Central Divisional Sales Manager.

MARCY L. SPERRY

Marcy L. Sperry, 69, President of Washington Gas Light Co. died suddenly on March 30th at Washington, D. C.

Mr. Sperry had been president of his company and its subsidiaries since 1932. He was with the Stone & Webster Service Corporation of Boston, from 1913 to 1931, when he left to become vice-president and general manager of the Fall River Gas Works Company. Earlier, he was with utilities companies in Savannah and Minneapolis.

Mr. Sperry was born in Annapolis, Md. and attended Pratt Institute in New York and Massachusetts Institute of Technology, from which he was graduated in 1900.

Koppers Co. Names Sturrock Research Engineer

Dr. M. G. Sturrock, coal tar research engineer, named manager of development for the tar products division of Koppers Co., Inc.

Minneapolis-Honeywell Elects Murray V. P.

Howard L. Murray has been elected vice-president of Minneapolis-Honeywell Regulator Co. For the last sixteen years Mr. Murray has been president of H. Belfield Co., Philadelphia control valve makers, recently acquired by Honeywell.

Peak Load Experiences

(Continued from page 20)

be shared equally by the substitute gas manufactured and by the natural gas whose transmission emergencies and whose inability to meet peak demand requirements make the substitute gas plant necessary.

6. In closing I hope you will study your gas sendout problem and your gas rate structure so that when natural gas does arrive in Wisconsin, you will find it possible to supply unlimited quantities of househeating gas at a therm rate which will allow you to maintain a standby gas plant to manufacture peak load gas which will also be available for public protection in case of natural gas pipeline periods of emergency.

Paper Presented at the Wisconsin Utilities Association Annual Convention in Milwaukee, Wisconsin on November 1, 1948 and revised by the author.

Interchangeability of Gases

(Continue from page 26)

17. Progress Report on Mixed Gas Research Project TL-1, J. F. Anthes. Presented at the 1948 Joint Production & Chemical Committee Conference, May, 1948.
18. "Variations in Interchangeability Formulae in High Btu Gases," L. J. Willien, American Gas Association Proceedings 843-856, 1938.
19. "Interchangeability of Fuel Gases," Jesse S. Yeaw, Rochester Gas & Electric Corporation. Chapter 8, 179-202 Gaseous Fuels (1948).
20. "Stand-by Gas," Leon J. Willien, American Gas Association Proceedings 158-171, 1934.
21. "Degree and Extent of Cracking of Gas oils," Hugh E. Ferguson, *Gas Age*, Vol. 90, August 27 and September 10, 1942.

Eaton Metal Products Co. School on L.P. Carburetion

An LP Carburetion School was held at the factory of the Eaton Metal Products Company — 4800 York Street — Denver, Colorado, on February 10th, 1949.

The School covered the theory and practical application of LP Gas Carburetion. It was under the general supervision of L. D. Turner, Manager of the Gas Equipment Division of Eaton Metal Products Company, assisted by L. G. Smith of Lubbock, Texas, field-representative of Ensign Carburetion Company; William E. McCabe, Assistant Manager of Gas Equipment Division of Eaton Metal Products Company and Jesse R. Allen, Carburetor Specialist of the same company.

Over 100 dealers and servicemen from six different states were present at the school.

Eastern Natural Gas Regional Sales Conference

The Eastern Natural Gas Regional Sales Conference, sponsored by the Residential Gas Section of A.G.A. was held at Hotel William Penn in Pittsburgh March 14-15.

Under the chairmanship of Raymond D. Little, Sales Manager of Equitable Gas Company, a large attendance listened to a comprehensive program offered by speakers well known in the gas industry. The program in brief follows:

This industry of Ours:—Mr. Robert W. Hendle, president of A.G.A. gave the keynote address with a summary of conditions in the industry and the present outlook. Home Service in the industry, a dramatized skit by Lois Dinneen and Carolyn Evans of Equitable Gas Company described Home Service activities in the customer's Home.

Stanley C. Gorman, Sales Promotion Director of the Gas Water Heater Division of G.A.M.A. pointed out the sales opportunities for 1949 in the "Court of Flame" program now well under way.

Cecil M. Dunn, Vice President in charge of sales for Estate Stove Co. offered the basic sales points on gas range promotion, giving a blackboard demonstration in dramatic style.

Jessie McQueen, Home Service Counsellor of A.G.A. spoke of the wide influence of this promotional department of the industry with 1200 active representatives.

H. P. Morehouse, Assistant Sales Manager—Gas, with Public Service Electric & Gas Co. of New Jersey offered stimulating ideas and methods for building the gas heating load in the face of peak load demands and gas heating restrictions.

Marvin Smith discussed installations of heat pumps for homes and commercial establishments, citing operating costs and other data

C. C. Young, Research Engineer of Gas Service Co., Kansas City, Mo., gave an interesting and informative talk on the combination oil and gas burner. The dual-fuel burner has been accorded wide acceptance in relieving peak loads.

Prof Erwin H. Schell of Mass. Institute of Technology spoke on the problems of top management and the necessary changes in policy to meet changing business conditions.

The program of the morning session of the second day was presided over by Christy Payne Jr., Vice Pres. of the Peoples Natural Gas Co.

Frank J. Nugent, Sales Promotion Mgr. of Bryant Heater Co., and President of G.A.M.A. discussed the outlook for gas appliance sales with a frank recognition of present conditions and an unbridled optimism as to the outlook for 1949.

C. H. Rippe, Sales Director of Home Appliance Division of Hamilton Manufacturing Co. featured in his talk the load-building value of the automatic clothes dryer and what had already been accomplished.

Dr. A. W. Gauger of Penna. State College discussed the results of his research and experimental work on gas incineration.

Ira J. Rapson, Asst. Sales Manager of Michigan Consolidated Gas Co. spoke on the promotion and sale of gas incinerators, citing market potentials and load-building value as well as consumer acceptance.

Frank H. Steining, Sales Manager of Refrigeration Division, Hamburg Brothers of Pittsburgh, featured in his talk the wide acceptance of Gas Refrigeration and how it aids in meeting the competitive load.

The afternoon session was presided over by George L. Scofield, Assistant to the President, Republic Light, Heat & Power Co. of Buffalo.

James F. Howley, Manager Dealer Relations of Brooklyn Union Gas Co. spoke on Dealer Participation. His address is published in full elsewhere in this issue.

W. S. Redpath, Account Executive of Ketchum MacLeod & Grove, spoke on the utility local tie-in through advertising with the national promotional campaign.

The meeting closed with the motion picture "Our Silent Partner,"—the story of natural gas from the well to the consumer.

The "Friendship Room," sponsored by the Gas Appliance Manufacturers was the Mecca for all and sundry from 5:30 to 7:30 p.m. each day.

Sprague Meter Co. Appoints Paige Resident Agent Atlanta

Dana A. Paige is now Southern Resident Agent for Sprague Meter Company of Bridgeport, Conn. with headquarters at Atlanta, he will cover the southeast territory in conjunction with H. Ward Cheeseman who operates from headquarters at Bridgeport.

Standard Sizes Adopted for Pamphlets and Books

With the adoption of three standard sizes—one for pamphlets, one for books, and one for pocket-size books—the American Standards Association has acted to bring about greater uniformity in the size of American Standards. At present, American Standards are published in some 20 different sizes by the many national organizations that are active in the standardization program.

The three sizes now adopted by ASA are: 8½ x 11 in. for pamphlets; 6 x 9 in. for books; and 5¼ x 7¾ in. for pocket size books.